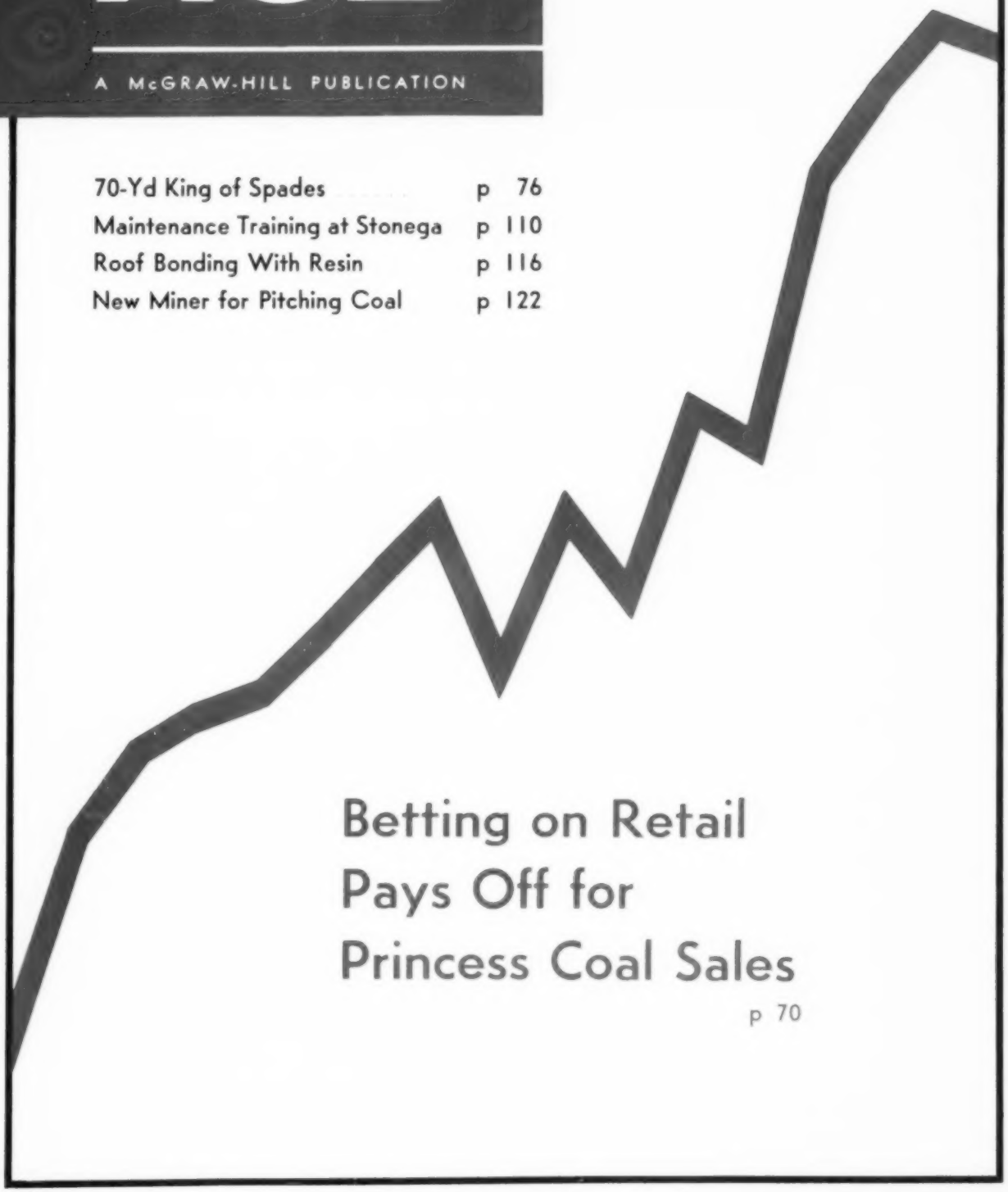
COAL AGE

JANUARY, 1958 PRICE $1

A McGRAW-HILL PUBLICATION

70-Yd King of Spades p 76
Maintenance Training at Stonega p 110
Roof Bonding With Resin p 116
New Miner for Pitching Coal p 122



Betting on Retail Pays Off for Princess Coal Sales

p 70

"Talk up" increased production—greater safety...with these M-S-A COMMUNICATION SYSTEMS

M-S-A MINEPHONE

Dispatcher sends orders instantly and simultaneously to all motormen with this modern, underground two-way voice communication system. Motormen receive and reply while trips are in motion—keep haulage movements coordinated with production demands. This results in smoother, faster, and more continuous trip movements throughout the mine.

Messages clear tracks for outgoing loaded trips and incoming empties. This system puts an end to traffic tie-ups, errors and accidents; prevents excessive stop-and-start strain on equipment. Write for more detailed information.

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• "Jeep" operator requests instructions from dispatcher and maintenance shop for section assignment . . . speeds emergency repair.

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For accurate, instant response between the hoisting engineer and cage, here's the voice communication system to install. Whatever the job—load leveling—shaft repairs—shaft inspection trips—passenger transportation—the M-S-A HoistPhone provides better safety and efficiency through dependable, continuous two-way voice communication at any level, and while the cage is in motion.

Requires no special training . . . simple to use . . . dependable in operation. Write for further information.

• The hoisting engineer is able to control all movements of the cage by communicating with cage rider over the M-S-A HoistPhone.

• Worker uses microphone in cage to tell the hoisting engineer where he wants to go. Loudspeaker mounted on top of cage.

MSA
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When you have a safety problem, M-S-A is at your service . . . our job is to help you

MINE SAFETY APPLIANCES COMPANY
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At Your Service: 77 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

B.F.Goodrich report:

B.F.Goodrich belt resists fire, mildew and crushing impact

WHEN this Pennsylvania mine company ordered a B.F.Goodrich conveyor belt made with fire-resisting rubber, they took a big step toward increased mine safety without sacrificing belt life.

The belt has to be tough to take the 21 hours-a-day, 5 days-a-week service. It's exposed to dampness and mildew, must stand the crushing impact of 3 tons of coal each time a shuttle car unloads.

Yet this belt is expected to equal—or even surpass—the long service records made by other B.F.Goodrich Caricoal belts in underground service. That's because the special fire-resistant rubber used in the belt also has high resistance to impact, abrasion, oil, grease, tearing, cutting, gouging, and even mildew attack.

There is no fuel for fire in the rubber of this belt. The B.F.Goodrich fire-resisting belt will not support combustion or spread fire. All B.F.Goodrich belts made with the flame-resisting rubber have been accepted for listing as fire resistant by The Bureau of Mines (Acceptance No. 28-6).

Let your B.F.Goodrich distributor show you how longer-lasting Caricoal conveyor belts can cut your coal-handling costs, reduce maintenance costs, and if made with fire-resisting rubber, reduce the chance of fire in your underground mines. *B.F.Goodrich Industrial Products Co., Dept. M-245, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Frontline Protection with

Hulburt

Quality Lubricants

Hulburt AP Grease

now available in

the famous battle-tested combat team of

AP GREASES and No. 11 LUBRICANTS

The never-ending production battle waged in the depths of the mines takes its toll on frontline equipment unless that equipment is properly serviced and kept in peak repair.

The Hulburt Quality Team—AP Greases and No. 11 Lubricants—carries with it an unmatched record for top performance in the coal mining industry. Losses due to down time are decimated and the operating life of equipment is extended to its maximum. In addition, the actual consumption of Hulburt Quality Lubricants is far less than that of similar products. In short, you need less when you use the best—Hulburt Quality Lubricants.

AP GREASE

Heavy duty protection is assured with this recommended "Strawberry Grease"—a Hulburt Quality product containing Du Pont's Estersil. AP Greases have no melting point and are completely water resistant.

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Dependable and economical when used in the servicing and maintenance of hydraulic systems and gear cases. These Hulburt Quality products are hailed for highest film strength, plus positive oxidation, rust and anti-foam protection.

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Hulburt

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Philadelphia 34, Pa.

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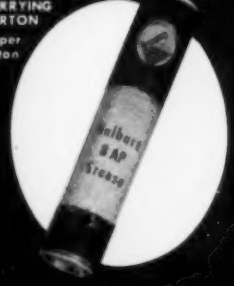
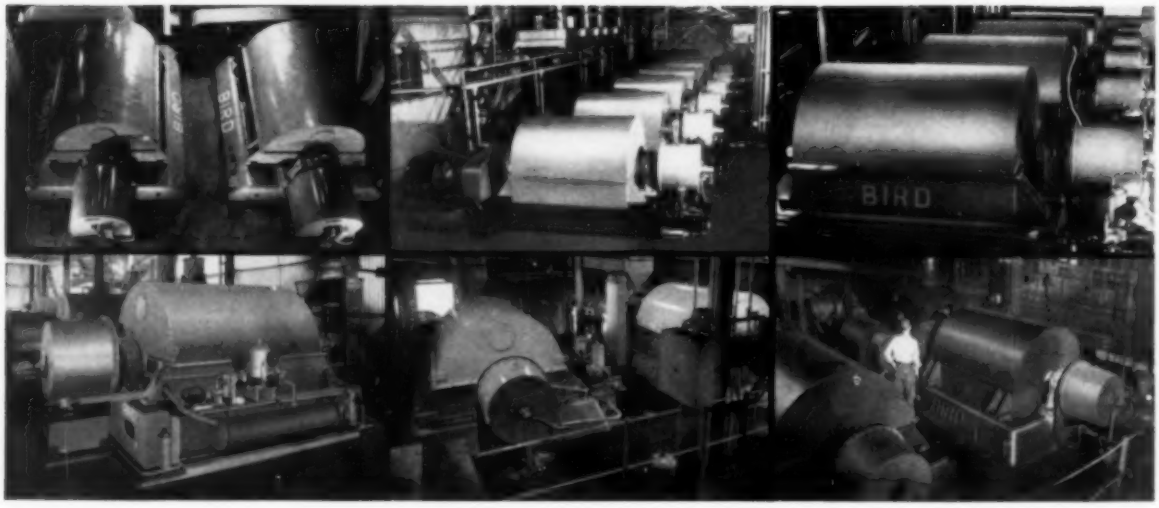
55 GALS.

QUARTER DRUM

PAIL—38 lbs.

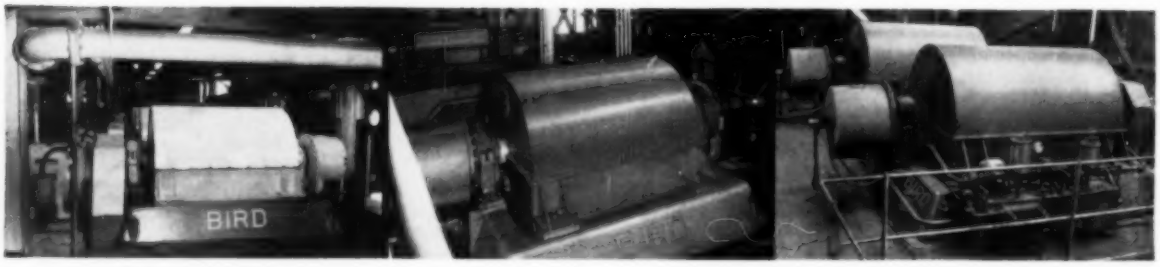
CARTRIDGE—1 lb.
IN HANDY CARRYING CARTON
10 per carton





why BIRD COAL FILTERS

are now dewatering millions of tons of fine coal



BIRDS get it dry. The fine coal is as dry as is discharged from any type of mechanical unit, given the same wet screen analysis.

At lowest net cost per ton. The Bird does the job at six cents per ton or less, based on actual records from a number of installations. This low figure includes write-off, power and maintenance.

BIRDS can handle relatively dilute feeds. In table plants, for example, no predewatering screens are needed, and there is no coal in the effluent from the Bird to require additional processing equipment.

BIRDS are just the ticket for dewatering cyclone underflows. They get them down to a much lower moisture content than obtainable by any other method used for this purpose.

Ask us to show you what the Bird Coal Filter can do on *your* coal and *your* tonnage.

BIRD
MACHINE COMPANY

SOUTH WALPOLE, MASSACHUSETTS
Regional Offices: EVANSTON, ILLINOIS • PORTLAND, OREGON

This Month in COAL AGE

JANUARY 1958

NEW FORMAT . . .

Beginning in this issue, *Coal Age* News Roundup, Personal Notes and other features will appear at the front of the book. For a quick check on where to find your favorite reading, consult the contents below and on pp 7 and 11.

Editorials p 69

Betting on Retail Pays Off For Princess Coal Sales p 70

70-Yd King of Spades: Pacesetter at New River King p 76

Pillar Extraction With Continuous Miners p 92

Current-Carrying Capacity of Portable Power Cables on Reels p 98

Incentives for Mine Foremen p 104

Training: Foundation of Better Maintenance at Stonega Coke & Coal p 110

Cementing Coal-Mine Roof p 116

New Continuous Miner Especially Designed for Pitches p 122

Foremen's Forum p 130 **Operating Ideas** p 134

Equipment News p 144 **News Roundup** p 26

Coal Commentator p 12

► Retail Merchandising

Betting on Retail Pays Off for Princess Coal Sales . . . . . p 70

Daniel Jackson Jr., Assistant Editor, *Coal Age*

Recognizing the retail market as one with security and long range potential, Princess Coal Sales, early in the '40s, began to establish itself as a career company in this market. By organizing a sales program to meet the demands of today's market and by merchandising a Patsy stoker coal especially suitable to the domestic consumer, the company has emerged as one of the leading retail coal sales companies in the country, with 70% of its production of 1,250,000 tons per year going to the domestic consumer. Markets for Patsy and Jane Ann coals are half a continent wide, plus exports. Retail distribution covers the South, Middle West, Northwest and Canada.

Highlights—Sales growth over the years; how Princess covers industrial markets also; advertising to develop the domestic consumer.

► Stripping, Preparation, River Loading

70-yd King of Spades: Pacesetter at New River King . . . . . p 76

A. E. Flowers, Associate Editor, *Coal Age*

The world's largest shovel takes a 70-yd bite every 50 sec at Peabody's 2-million ton strip operation near Freeburg, Ill. Two vertical rotary overburden drills, 10-yd coal shovel and fleet of 55-ton tractor trailers are other major units. Preparation plant, first in coal industry to be sheathed in stainless steel, processes 1,000 tph. Coal goes to market by rail, water or truck. Transportation to 1,500-tph river dock is over 23 mi of company railroad.

Features—Facts about the 70-yd shovel; details of new-type belt conveyor; description of car haul permitting one man to load 40-car trains without interruption.

► Continuous Mining

Pillar Extraction With Continuous Miners . . p 92

E. D. Slone, District Mining Engineer, Lynch Dist., U. S. Steel Corp.

Operating in both thick and thin coal, mines in the Lynch Dist. of U. S. Steel use ripper-type, boring type and semirigid-head continuous miners for maximum efficiency under varying conditions. Rooms are 1,000 ft deep with ripper units and pillars are extracted by alternating cuts to the right and left. Angle pillaring of rooms 300 ft deep is the practice with the boring-type units, with a one-way 90-deg system for the semirigid machines. The general attack is advance on one side and retreat on the other or full retreat, in panels.

Footnote—Adapting a section developed for conventional mining to continuous operation.

► Trailing Cables

Current-Carrying Capacity of Portable Power Cables on Reels . . . . . p 98

John J. McNiff and **A. H. Shepherd,** Simplex Wire and Cable Co., Cambridge, Mass.

Overheating is the prime cause of cable failure, and

(*Continued on p 7*)

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with the **Lee-Norse BUS & JITNEY**

Take a real good look at these LEE-NORSE "TIME-SAVERS"! Like modern misers they hoard minutes into extra productive hours by cutting portal to portal time—reducing costs—increasing tonnage output.

Lee-Norse MINE PORTAL BUS

(Locomotive Type)

This self-propelled Portal Bus for hauling section production crews to and from the face is unique with its split roof construction giving the driver an unimpeded, all directional view . . . the trolley is always within easy reach of the operator. Our standard low and high type Portal Bus operates in the majority of coal mines and will haul from 13 to 20 Men. This Portal Bus is powered with one (1) large motor (15 H. P.) and has two (2) independent braking systems for complete safety — (airplane-type) disc brakes hydraulically operated on each axle and dual mechanical hand operated service brakes on each wheel.

TIME IS MONEY — SAVE IT with the Lee-Norse Mine Portal Bus!

Lee-Norse JITNEY

Wherever they're in use—they're regarded as a time saving asset. Fleet and versatile the Jitney furnishes quick, sure transportation to and from the working face for key personnel, inspectors, engineers, etc. When required the Jitney can be pressed into service as an ambulance and is suitable for pulling fire fighting equipment.

TIME IS MONEY — SAVE IT with the Lee-Norse Jitney.

Lee-Norse Company

CHARLEROI, PA.

"SPECIALISTS IN COAL MINING EQUIPMENT"

the prevention of such overheating has been the objective of recommendations published as early as 1940 dealing with current-carrying capacity in air, maximum conductor capacity, correction factors for deviations from standard ambient temperatures, and derating factors for reducing capacity in relation to number of layers on reels. Verification of these earlier recommendations and a practical method of rating cables used on reels was the goal of recent test work, along with the determination of the difference, if any, between cyclically varying and steady loads, and between AC and DC. Test results were within 10% (20% for two layers on a reel) of the commonly used derating factors, and type of loading has no significant effect.

► Supervisory Stimuli

Incentives for Mine Foremen ..... *p 104*

C. W. Rountree Jr., Director of Industrial Engineering, Island Creek Coal Co., Holden, W. Va.

True incentives, in contrast to bonuses, are based upon the establishment, by appropriate methods, of standards for performance of the units being supervised. Both the supervisor and the company benefit, the one through better performance and the other by being rewarded for such extra accomplishment. Successful incentive plans must incorporate six basic factors, and six pitfalls must be guarded against.

Along the Way—The basic differences between bonuses and incentives; what incentives can't do.

► Training

Training: Foundation of Better Maintenance at Stonega Coke & Coal ..*p 110*

Stonega Coke & Coal Co., Big Stone Gap, Va., faced an acute shortage of qualified maintenance men after completing a program of mechanization. To develop mine mechanics and other mechanics capable of handling a major rebuilding, the company embarked on an extensive training program. The program revealed the desire of young men for careers in mine maintenance and aroused the interest of older employees in improving their skills. A major gain from the program is a significant decrease in down time.

Sidelights—How trainees are selected; how training is done; how maintenance is organized.

► Roof Support

Cementing Coal-Mine Roof ..... *p 116*

E. R. Maize, mining health and safety engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

Possible new methods of preventing falls in the critical 25-ft face zone include cementing the roof layers together in plywood fashion to make a strong beam.

(*Continued on p 11*)

This Month in COAL

SLOW START—The slackened pace of production in both the bituminous and anthracite industries in the latter part of 1957 shows no signs of change in January, which means that both industries are getting off to a slower start on the year than in 1957. The major factor in the decline of bituminous to around 485 million in 1957 was the business recession, helped as usual by continued competitive pressure, particularly in the railroad and domestic markets. Bright spots were utilities and overseas markets. Warm weather and continued competitive inroads were the big factors in the anthracite drop to around 25½ million.

GUESSING THE PICKUP—December brought some signs that the corner might be in sight. More experts on the economy were permitting themselves to be a little optimistic, and it began to look as if steel users were going to have to give up living off inventories and operating on a hand-to-mouth basis and really buy. These developments, plus continued consumer spending at a relatively high level and other favorable events, were contributing to a new evaluation of prospects. Betting in a number of corners now is that the worst is over and the upturn should be an undisputed reality not later than the end of the first half and perhaps the first quarter.

COAL PROBLEM?—The slowing down of the production rate, plus the bringing in of new capacity, generated their accompanying price pressure at the end of the year, and this, too, continues into 1958. There is no thought or evidence yet of a runaway deflation of coal prices, but the situation does confront coal with the possibility of a weakness that could reduce margins materially. Holding the price line thus becomes a major chore for the industry. Chances are good.

AHEAD IN CONGRESS—Coal men, as usual, have a personal as well as a corporate stake in developments in Congress, which went back to the grind this month. What might happen in some instances is as follows:

Personal Taxes—Will they be reduced, remain the same or be increased? The betting at the moment is no change, thanks to the furor aroused by Sputniks I and II, which have forced a realignment in defense thinking and generated a need for more money for development and production of counter weapons.

Corporate Taxes—Same conclusion.

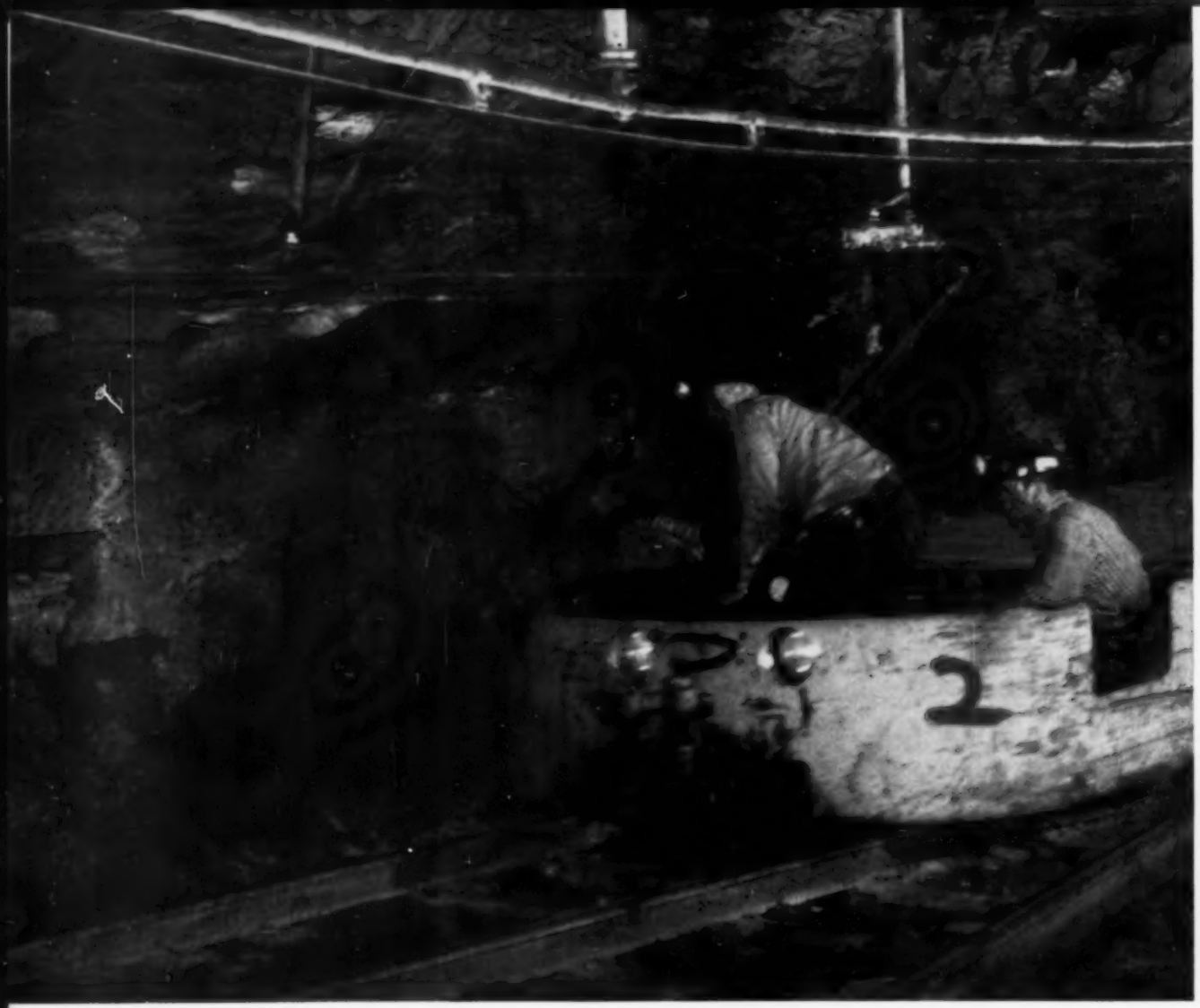
Depletion—No change. The debate over the country's scientific, military and psychological preparedness, and what ought to be done about it, along with increased political jockeying, probably will take up Congressional time to the point where items such as this will be passed over.

Natural-Gas Regulation—Same conclusion.

Oil Imports—No action in Congress and a running battle to keep rises under the voluntary program from getting out of hand.

Coal—Research Support—No action.

Labor Legislation—Possibly some steps to curb racketeering and prevent maladministration; otherwise little action.



THE CLINCHFIELD COAL COMPANY USES

Texaco Olympian Grease because

Proper storage and handling of Texaco Olympian Grease prevent contamination and help to extend its effective life in service.

One of the big things about Texaco Olympian Grease in mine car bearings is its fine lubricating qualities regardless of summer heat or winter cold. It is also highly resistant to mine water, mineral acids and other bearing hazards present in mining operations.

Consequently, Clinchfield mine cars start fast and easily without the usual wheel drag. Bearings are protected against dirt, moisture, with a grease that stays put. The grease itself is oxidation-resistant to prolong its service life.

In Clinchfield's case there is another factor to consider: Clinchfield holdings and equipment

Clinchfield mine cars at all mines—the newest Moss Mine #3 included—are all 100% Texaco lubricated.

it assures easier mine car starts

cover a 3-state area. Texaco offers the same uniform products in West Virginia and Virginia as it does in Tennessee—for that matter, as it does in all 48 States.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States and ask to see a Texaco Lubrication Engineer, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN . . . Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

CUT MINING COSTS

WITH *HEAVY – RUGGED – POWERFUL*

McCARTHY AUGER DRILLS

VERTICAL

MODEL 106-24

World's Fastest Heavy-Duty Vertical Auger Drill

Bores faster, deeper, larger dia. holes than any other auger drill. New gear reduction unit slows auger rotation for operation in hard rock formations. Drills 8" and 9" dia. holes readily in shale and sandstone formations, drills larger dia. holes up to 24" dia. in softer formations.

Write for Bulletin M-100

FINGER-TIP CONTROL

Gives Desired Rotating Speed Of Auger

HYDRAULIC FEED

Provides Any Speed Up To 6 Feet Per Minute Horizontal Feed Of Drill

COAL RECOVERY

"Walks" from hole to hole to auger high-quality Bonus Coal

An Ohio miner removes 450 tons of coal in each 6 1/2-hour working day with this Model 14 36-42 x 12' McCarthy drill, operated by two men. He drills 42" dia. holes 144' deep. Auxiliary conveyor eliminates spillage at hole. It operates on either side of drill for working blind cut. Twelve different models of McCarthy Coal Recovery Drills mine low-cost "bonus coal."

Write for Bulletin M-101 and M-102

HORIZONTAL

MODEL 104

Lowest Drilling Costs per foot, Self-Propelled or Truck-Mounted

Bores up to 12" dia. holes to 150' depth faster, cheaper than any other horizontal drill. Requires less working space, saves many man-hours. . . operates easily in tight, hard-to-reach locations.

Write for Bulletin M-105

THE SALEM TOOL CO.

SOUTH ELLSWORTH AVENUE

SALEM, OHIO. U. S. A.

SALEM

This Month COAL AGE in

CONTINUED

Epoxy resin has the necessary characteristics. Injection tests at pressures of 1,150 psi have been conducted. Initial results are encouraging, but more work must be done to arrive at definite conclusions.

Sidelights—What makes a good bonding agent for mine roof; what happens when it goes into the top under pressure.

► Continuous Mining

New Continuous Miner Especially Designed for Pitches ..... *p 122*

H. H. Gardner, General Manager, Crow's Nest Pass Coal Co., Fernie, B. C.

Borecut miner designed to cut entries of any desired shape when driving on strike regardless of seam pitch. Cutting height is over 14 ft, and the machine can load loose coal and rock and lift crossbars. The basic member is a hollow barrel with spiral flights inside to carry the coal back to a bridge conveyor. A funnel-shaped cutting head is mounted on the end of the barrel, which can be moved up and down by hydraulic jacks taking a succession of cuts from top to bottom and across the place. During trials to Aug. 31, 1957, the prototype machine in 5 mo worked 142 production shifts, driving 990 ft of entry, erecting 199 timber sets, mining 11,640 tons of coal and loading out 41 cars of rock. Average coal output is about 102 tons with a 4-man crew.

In Addition—Other applications, including serving as a platform for roof-bolting.

Editorials ..... *p 69*

Sooner and higher.

Coal Commentator ..... *p 12*

Needed facts; Real contributions; Methane elimination; Attention worthy; To see better.

Foremen's Forum ..... *p 130*

New and novel in '58.

Operating Ideas ..... *p 134*

Helpful tips on operating bulldozers in rock; Plastic valve beats corrosive water; Drill on shovel boom solves problem; Side-dumping car.

Equipment News ..... *p 144*

A light one-man drill, special film-forming reagent to protect coal, long-boom loader, and other interesting items make up this section.

News Roundup ..... *p 26*

The natural gas struggle continues, pure coal chemicals are produced on a large scale, and Far Eastern countries make industrial progress.

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The Coal Commentator

Needed Facts

The day when coal will be faced with the need for eliminating or neutralizing acid in its water discharge may not be too near—and again, may not be too far off either, relatively speaking.

The date probably will be a result of the interaction of public pressure for cleaning up streams on the one hand and progress in finding relatively inexpensive methods on the other. At the moment, the idea of getting water out of deep mines immediately to prevent acid pickup is showing promise, while the old-reliable methods at strip mines are keeping water out of the pit and burying sulfuritic material.

What can be done about the problem by the average operator at the present time? One authority suggests keeping a record of water discharge, and with it, periodic figures on acid content. Since how much water and how much acid will be the measure of the job if and when it comes, this is a logical step. Facts always are better for reaching the right answer.

Real Contributions

Two recent events serve to remind us of the mostly unsung and frequently unappreciated yet vital jobs done by mine inspectors. These events were the death of J. V. McKenna and the retirement of George S. McCaa, Pennsylvania veterans with long records of contribution to safety progress, including not only the uncovering and elimination of hazards, and the education of mine workers and mine management, but such other things as the development of the modern oxygen apparatus. This latter was one of the accomplishments of Mr. McCaa during earlier service with the Mine Safety Appliances Co.

Though differences of opinion and misunderstandings are at times unavoidable in operator-inspector relationships, they do not obscure for long the achievements of the inspectorate. In the careers of Messrs. McKenna and McCaa all inspectors—and operating men too—can readily discern the profound and long-term benefits of their labors.

Gas Elimination

"Since 11:15 AM on Monday [Oct. 28, 1957] methane drained from the Greatrow seam of Wolstanton colliery has been used to supplement the town gas supply for homes and industry at Stoke-on-Trent." So begins a report in the Nov. 1 issue of *Iron and Coal Trades Review*, which notes that this is the first stage of a plan that eventually will include Holditch, Stafford, Hem Heath and Chatterly Whitfield collieries as well. Wolstanton and Holditch eventually will provide 5,000,000 cu ft of gas daily with a methane content of 55 to 75% and average Btu of 700.

Forty collieries in Great Britain now drain methane before mining, as do an increasing number of mines on the Continent. Great depths contribute to high methane emission, and this is one of the major differences between overseas and U. S. mines. So, the opportunity for methane drainage here is not as great, but it might be worthy of consideration in the number of instances even though it was bled off into the air.

Attention Worthy

"An analysis of interviews showed that the big bugaboo is really the dust caused by shoveling ashes from the ash pit into cans." This highlight of a consumer survey, reflecting the fact that home owners with automatic equipment are much less vehement about dust than hand-fired users, leads the Anthracite Information Bureau to announce in its No. 33 *Newsletter* that it is looking for ideas to reduce or eliminate the problem.

As oil and gas prices continue to rise, coal's basic advantage will grow. Perhaps the answers to dust and other objections may be fairly easy to find when the proper effort is devoted to the job. At any rate, witness the report on how concentration on retail pays off for Princess Coal Sales in this issue, the domestic market still is very much worth some attention and application.

To See Better

Light has always been a preoccupation of the deep miner—and for an excellent and obvious reason. The first light had no sooner been taken below than the push to improve it began. The push since has been broadened to take in lighting everywhere, including surface installations.

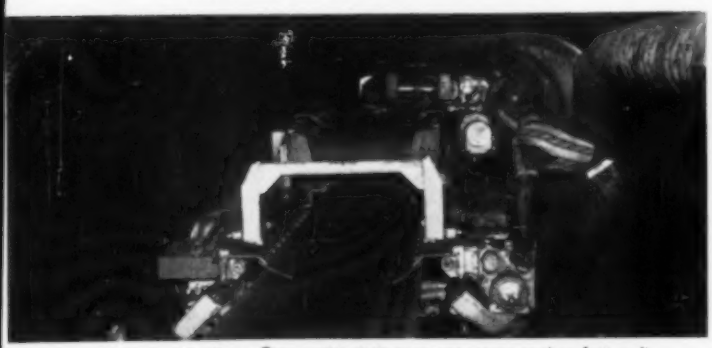
Picking lamps were early examples of improved plant lighting. Now, with the emphasis on maintenance, shop lighting comes prominently to the front. How can you find out how your lighting stands? The National Lighting Bureau, 155 E. 44th St., New York 17, sponsored by the Industrial and Commercial Lighting Equipment Sec. of the National Electrical Manufacturers' Association, calls attention to the fact that your local electrical contractor, using its standards, will check your lighting setup and, if necessary, supply a relighting plan which, if followed out, will earn you a "Certificate of Conformance." **The benefits of good light have been proved by experience and the National Lighting Bureau is eager to help you reach "Certified Lighting" standards. See your contractor or write the bureau.**

This rubber tired cutting machine moves anywhere in the mine . . cuts anywhere in the seam.

Only 26½" high, this tread-mounted loader has a rated loading capacity of 10 tons per minute.

Goodman makes a complete line of shuttle cars, either AC or DC operation, for high or low coal.

Goodman Continuous Borers have put face efficiency on a new high level at every installation.



The Ropex® extensible belt conveyor moves coal as fast as it can be mined by any continuous miner or loading machine.

Where operating efficiency is highest you'll find GOODMAN Equipment

For fifty-seven years Goodman has paced the industry, meeting and anticipating the demand for higher production at lower cost. In high coal or low . . . for conventional or continuous mining . . . there's a Goodman unit to provide top efficiency in every operation.

The Goodman Ropebelt conveyor is the most useful and practical conveyor available today.

Whatever the length of haul, whatever the load, there's a Goodman locomotive for the job.

If you would like to know more about any of these Goodman machines we'll be glad to send our latest illustrated literature. Write us today.

GOODMAN
MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

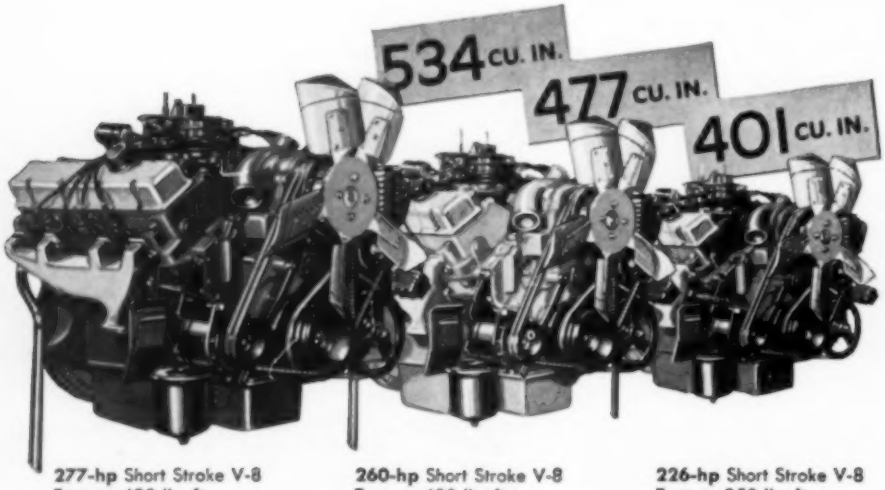
CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

FORD makes the

3 all-new Super Duty V-8's

- Gross horsepower up to 277
- Gross torque up to 490 lbs-ft
- Modern Short Stroke design
- Three-stage cooling system
- Machined combustion chambers
- Sodium-cooled exhaust valves
- Stress-relieved block and heads
- Pyramid-type connecting rods
- Internally mounted oil cooler
- Two-quart oil filter
- Water-jacketed intake manifold
- Submerged-type electric fuel pump



277-hp Short Stroke V-8
Torque: 490 lbs-ft
@ 1800-2300 rpm

260-hp Short Stroke V-8
Torque: 430 lbs-ft
@ 1800-2300 rpm

226-hp Short Stroke V-8
Torque: 350 lbs-ft
@ 1800-2300 rpm

10 all-new Extra Heavy Duty Series

GVW's up to 51,000 lb. For '58, ten new basic series are added to Ford's already extensive Heavy and Extra Heavy Duty line. Four new Tilt Cabs, four new Conventionals, and two new Tandem models offer GVW ratings up to 51,000 lb.

GCW's up to 75,000 lb. New T-950 Tandem is rated for 75,000-lb. GCW. Biggest single-rear-axle models are rated for 65,000-lb. GCW.

Front axle capacities up to 15,000 lb. Choice of three front axles in most new Ford Extra Heavies. Rated capacities of 9,000 lb., 11,000 lb. and 15,000 lb.

Rear axle capacities up to 29,000 lb. Wide choice of rear axles includes single-speed and two-speed, single reduction and double reduction types. Capacities range from 18,000 lb. to 29,000 lb.

Bogie axle capacities up to 38,000 lb. For '58 there are two new Extra Heavy Duty Tandem Axle models. The new T-950 Series features a tandem rear axle assembly rated for 38,000 lb. New T-850 Series offers choice of 28,000- or 34,000-lb. bogies.

New highway transmissions. Roadranger transmission is available in all ten new Ford Heavies and Extra Heavies. Up to 33% less shifting. "Short Fourth" highway transmissions also available on "F" and "C" Series. With these new transmissions, engines operate in peak horsepower range with greater fuel economy.

big move for '58

–up to 534 cu. in.

New Series T-950 Tandem model is biggest capacity Ford truck ever built! Rated up to 51,000-lb. GVW—75,000-lb. GCW. New 534-cu. in. Super Duty V-8 provides exceptional horsepower and torque with rugged durability.

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!

CARDOX

(NON-EXPLOSIVE MINING METHOD)

THESE MINES *Are Now Using*

EITHER CARDOX OR AIRDOX MINING METHODS

VIRGINIA

Buchanan County Coal Corporation
H. C. Harman Coal Company
Margaret Ann Coal Corporation
Panther Coal Company, Inc.
Preston Mining Company
Sunrise Coal Company
Sycamore Coal Corporation

WEST VIRGINIA

Ames Mining Company (2)
Badger Coal Company
Bear Run Coal Company
Big Laurel Coal Company (2)
Boone County Coal Company (2)
Brule Smokeless Coal Company
Crozer Coal and Coke Company (2)
Eastern Gas and Fuel Associates
Elk Lick Coal Company
Ethel Chilton Mines (2)
Gay Mining Company (2)
Gulf Mining Company (3)
Island Creek Coal Company (3)
Imperial Smokeless Coal Company
Jacob's Fork Pocahontas Coal Company
Johnstown Coal & Coke Company
Kimberling Collieries Company
Lake Superior Coal Company
Lorado Coal Mining Company
L & W Coal Company
Maust Coal & Coke Company
Nassau Coal Company (2)
New River Company
North Fork Coal Company (2)
Olga Coal Company
Omar Mining Company (2)
Pardee and Curtin Lumber Company (2)
Peerless Coal & Coke Company (2)
Peters Creek Coal Company
Raine Lumber and Coal Company
Raleigh-Wyoming Mining Company
Royalty Smokeless Coal Company
Slab Fork Coal Company
Spruce River Coal Company
Sycamore Coal (2)
Tioga Coal Corporation
Turkey Gap Coal Company
Westmoreland Coal Company
Winding Gulf Collieries

KENTUCKY

Bell & Zoller Coal & Mining Company (2)
Begley & Conley Coal Company
Big Jim Coal Company
Buck Branch Coal Company
Carrie Lou Coal Company (2)
Carrs Fork Coal Company
Deby Coal Company (2)
Eastern Coal Corporation
Fed's Creek Coal Company
Field's Branch Coal Company (3)
Inland Steel Company
Kentland Elkhorn Coal Company (4)
Kentucky Maid (3)
Kentucky Mountain Coal Company
Knott Coal Corporation
Liberty Coal Company
Lynn Coal Company
Majestic Collieries Company (2)
Nashville Coal, Inc.
Simpson Coal Company
West Kentucky Coal Company (2)

CARDOX CORPORATION

ANNUAL *Roll Call*

PENNSYLVANIA

Allegheny Coal Company
Barnes & Tucker
Cambria Clearfield Mining Company .....(2)
Campbell Coal Company
Johnstown Coal & Coke Company
Mathies Coal Company
Marco Coal Company
Morrisdale Coal Mining Company
Ontario Coal Mining Company
Pennsylvania Coal & Coke Company .....(3)
Pittsburgh Coal Company
Rochester & Pittsburgh Coal Company
Sager Coal Company

OHIO

Clean Coal Company
Columbia Southern Chemical Corporation
Gem Coal Company .....(2)
Hanna Coal Company of Ohio .....(3)
Lorain Coal & Dock Company
Merrick Coal Company
Ohio Land & Railway Company
Powhatan Mining Company
Warner Collieries Company

ILLINOIS

B & W Mining Company
Bell & Zoller Coal & Mining Company .....(3)
Belle Valley Coal Company
Blue Blaze Coal Company
Carmac Coal Company
Chicago, Wilmington & Franklin Coal Company
Eddy Coal Company
Elk Coal Company
Freeman Coal Mining Corporation
Lincoln Coal Mining
Mid-Continent Coal Corporation .....(3)
Old Ben Coal Corporation
Parton Coal Company
Pschirrer & Sons Coal Company .....(3)
Sahara Coal Company
Truax-Traer Coal Company
Union Colliery Company

INDIANA

Enoco Collieries Company
Ingle Coal Corporation
Pandora Coal Corporation
Princeton Mining Company
R & H Mining Company
Snow Hill Coal Corporation .....(2)

COLORADO

Bear Coal Company
Black Diamond Fuel Company
Boulder Valley Coal Company
Canon National
Champion Coal Company
Clark Coal Company
Clayton Coal Company
Colorado Fuel & Iron
Colowyo Coal Company
Corley Coal Company
Dry Creek Coal Company
Imperial Coal Company
Jenkins & Mathies Coal Company
Juanita Coal & Coke Company
Keystone Mining .....(2)
Minerals Development
Taylor Coal Company
Tomahawk Coal Company
Vento Coal Company

MONTANA

Brophy Coal Company
Johnson Coal Company
Mountain State Mining Company
Nies Brothers
Northern Coal Company
Roundup Mining Company
Square Deal Coal Company
Western Coal Company

WYOMING

Colony Coal Company .....(2)
Ronocco Coal Company
Storm King Coal Company
T-K Coal Company

UTAH

Independent Coal & Coke Company .....(2)
Lion Coal Company

ARKANSAS

Quality Excelsior Coal Company

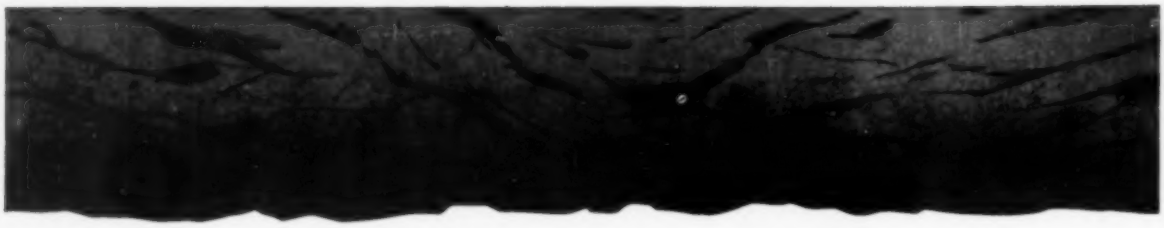
CANADA

Amalgamated Coals, Ltd.
Century Coal Ltd.
Lethbridge Collieries, Ltd. .....(2)
Midland Coal Mining Company
Red Deer Valley Coal Company, Limited

*INDICATES NUMBER OF MINES USING THE NON-EXPLOSIVE MINING METHOD

CARDOX
HARDSOCG
DRILLING EQUIPMENT
Complete line of drilling equipment designed to give you the maximum in drilling efficiency.

• 307 N. MICHIGAN AVE • CHICAGO 1, ILLINOIS •



Headroom a problem?

Here's Your Car!

This is another of those Bethlehem-built cars featuring slim, trim lines, sensible wheelbase, and very low sides. As you can see, it fairly hugs the rails; it's a scant 3 ft 5 in. high.

You'll find it a most practical design where headroom is a problem. The width has also been kept within moderate limits—only 6 ft 6 in. inside. Wherever there's a "tight squeeze" in haulageways—this is your car! Yet despite its slender contours, its capacity is 240 cu ft level-full.

Equipment includes all-welded body, 12-in. forged-steel wheels, cast-steel trucks, automatic couplers, and rubber draft gear. Empty weight of the car is 6,925 lb.

In mines where modernization programs are underway, this model has proved very popular. But if you prefer some other design, either high-side or low-side, Bethlehem can build it for you. We are equipped to construct any welded or riveted car for end-dump or rotary-dump service, and orders placed now can be scheduled for quick delivery. If you'll just phone or write our nearest sales office, one of our engineers will gladly give you full details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

"TD-6 4-In-1 can do *any job we give it*"

...states Ashland Mining Corporation, Ashland, W. Va.

Cleans sludge ponds. No trouble filling the bucket—even in "gooey" material. The operator simply uses the 4-In-1 clamshell action; "surrounds" bucket-dodging "gob" in one fast gulp!

Excavates, loads, grades, spreads, levels, clears, gives versatility unlimited. "After using the TD-6 4-In-1 awhile, we find it can be adapted to do any job we give it," states Supt. H. S. Oster, for Ashland Mining Corporation. "Saves man hours every day."

Builds and maintains haul roads. This view shows the 4-In-1 as an earth-rolling bulldozer—spreading and compacting material to provide truck access to a new area along railroad siding.

Move the "machine-selector" lever with fingertip ease—try all four multiple-purpose 4-In-1 actions. Try powerful-digging Skid-Shovel; "carry-type scraper," that's inch-close accurate; big-yardage bulldozer; stand-and-fill clamshell. Compare 4-In-1 four-machine utility to "single-action," limited-duty rigs. See your International Drott Distributor for a 4-In-1 demonstration.

Carries scrap-iron away. With clam, the TD-6 4-In-1 operator clamps down on scrap iron—and removes it to the junk pile! The unit does all kinds of maintenance work around the tipple.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL® DROTT®

TD-24 "strips" at lowest of any crawler on the

reports Morris Enterprises, Owensboro, Kentucky

Upgrade, downgrade, or on the level, famous Planet Power steering gives you positive and constant load control on turn or straightaway. And this planetary system that gives full-time "live" power on both tracks lets the TD-24 pull the same big loads on turns as on straightaways! Morris Enterprises owns this TD-24 that's stripping overburden near Knottsville, Ky.

Benching or 'dozing around curves is a cinch for the TD-24. TD-24 two-track turning power never backs off from the load—and does not let the load "fish-tail" the tractor or slip the tracks! Instead you "feed" power to both tracks to keep the full productive push where you want it!

cost per cu yd market...

On this stripping operation near Knottsville, Kentucky, Morris Enterprises are moving a maximum of 45 feet of overburden—to uncover a 42-inch coal seam. Overburden is a 5 to 10-foot earth layer; the balance, shale and soapstone.

An International TD-24 dozer is moving 50% of the overburden on a 60 to 70-foot wide cut ahead of shovel operation. A 3½-cu. yd. shovel moves the other 50%.

"This kind of performance sold me"

"Have been using International TD-24's since 1950," reports P. H. Morris, for Morris Enterprises. "The TD-24 has proven able to move dirt cheaper per cu. yd. than any other track-type tractor. Upkeep has been low and TD-24 ease of operation enables the operator to maintain full production—after hours of continuous dozing.

"Live power on both tracks while turning is a definite advantage for full load maneuverability. And shifting on-the-go speeds up the production.

"One of the TD-24's ran 7,500 hours before major overhaul on rails, shoes, and engine. Still in use with original rollers and sprockets.

"This kind of performance sold me on TD-24's for my operation."

See how you 'doze bonus yardage on the turns—stay "on course" with offset loads—keep positive load control, upgrade or down, with TD-24 Planet Power steering to eliminate "dead-track drag." Prove the cycle-speeding advantages of exclusive Hi-Lo shifting—for adjusting the speed to the load—for gaining capacity-adding reverse speed on shuttle dozing. Compare International's Cerametallic-faced engine clutch—for power-transfer efficiency—operating and servicing ease—long life! See your International Construction Equipment Distributor for a TD-24 demonstration!

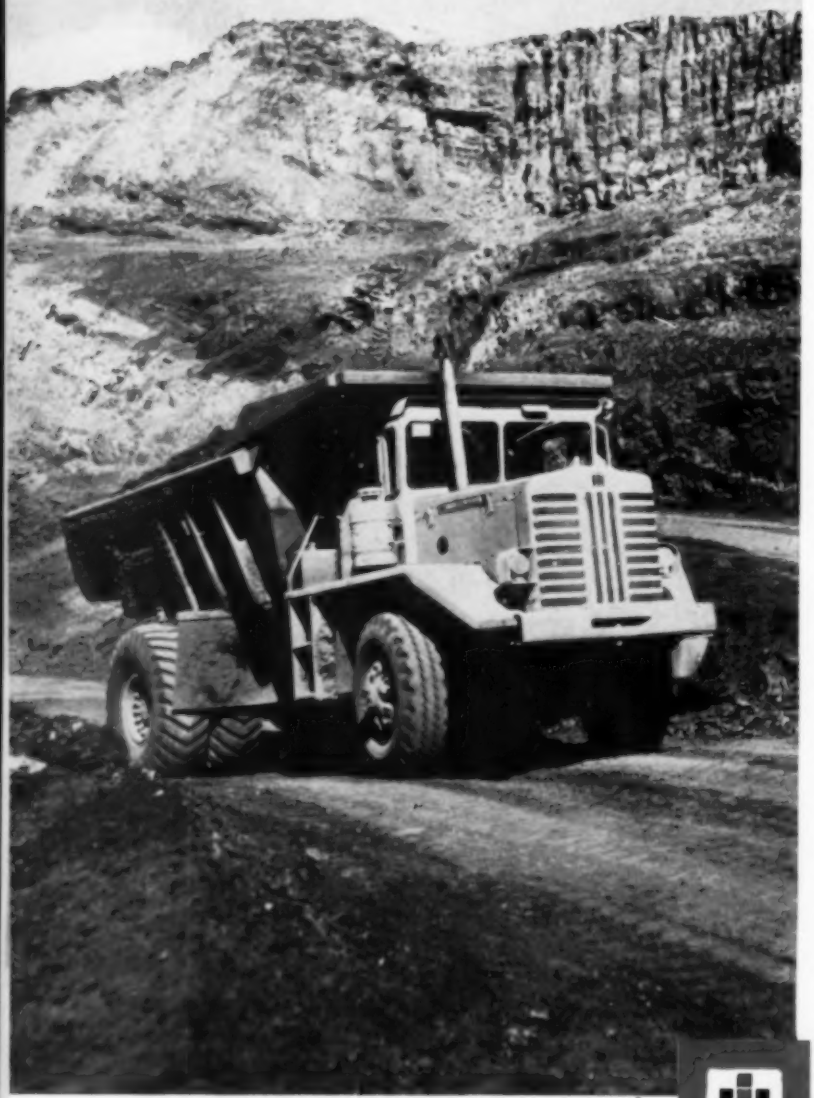
International® Construction Equipment

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

"95" Payhauler® beats trailer units by up to 50 seconds...

in 20% grade climb-outs!



Phosphate mine superintendent reports "95" gains up to 100 cu. yd. daily!

A bonus-powered International "95" Payhauler®, in carefully timed tests, climbed the winding 20% grade, up to 50 seconds faster than competitive crawler-pushed trailer units!

The Payhauler, and the two "articulated" hauling units, bring out 18 cu. yd. loads apiece at the Simplot Corporation's phosphate rock mining operation near Blackfoot, Idaho.

Supt. Robert Bulard reports: "The Payhauler gains approximately 100 cu. yd. daily over our other 18 cu. yd. haul units. Not only does it have greater speed, but the Torqmatic braking gives it greater safety as well. This morning, light rain made pit roads so slippery all equipment quit except the Payhauler. It never missed a load."

Power on Payhauler rear wheels delivers top operating efficiency on steep grades or under "slick" conditions where trailer units bog down completely. Prove the fast get-away surge, the extra climbing power, and up to 25% faster haul speed of an International Payhauler. That's the exclusive result of bonus turbo-charged diesel power; road-matched and load-matched gear choice; and the power-cushioning leverage of planetary drive axles!

Try Payhauler "pick-up truck" spotting ease. Exclusive high reverse speed, "zip-around" power steering, and grade-beating power get the credit! See how 12-second dumping with double-acting hydraulic hoist speeds the cycle. See your International Construction Equipment Distributor for a Payhauler demonstration.

International Harvester Co.
180 N. Michigan, Chicago 1, Ill.

Gentlemen:

☐ I am a contractor. ☐ Am an equipment operator (please check square that applies). Send me Payhauler Catalog (CR-603-G).

Name_____

Street Address_____

City_____ State_____

International® *Construction Equipment*

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

1957 has been a year of contrasts.

Significant advances in technology, the completion of a substantial portion of our program to expand our productive capacity in the U. S. and Canada and the strengthening of our marketing organization are all tangible achievements which will bring us both immediate and long-term benefits. On the other hand, a generally lower activity in new projects coming in has emphasized the narrowing profit margins faced by most businesses and points up our insistence on improving designs, reducing costs and increasing efficiencies.

Abroad, the picture is bright. Our subsidiaries report current high levels of business and there is great optimism for the future. Of particular interest is the success of our newest family member, Dorr-Oliver Pty. Ltd. of Australia, which opened its doors on January 1 of this year and by mid-year had far surpassed expectations. Growth of Dorr-Oliver (India) Ltd., another of our newer associates, has also been noteworthy, with the recent addition of local manufacturing facilities justifying still greater optimism.

SUGAR — In 1957 a total of 42 RapiDorr Clarifiers and 48 Oliver-Campbell Cane Mud Filters were sold to the cane sugar industry. A significant aspect of this outstanding record has been the increasing participation of our subsidiaries and representatives abroad. They are locally manufacturing, in some instances for the first time, 31 of these machines in Argentina, Brazil, England, France, Germany, India, the Philippines and South Africa.

POLYETHYLENE — The first Merco Pressure Centrifuges went into operation early last year removing catalyst from liquid polyethylene at capacities considerably in excess of original expectations. Overseas, British, Italian and German producers ordered Pressure Centrifuges for similar application in both new commercial scale and pilot plants.

SANITATION — One of the highlights of the year was D-O activity in the waste water disposal field. Four major new developments — all ideally suited for smaller plants — were introduced. The SpiroVortex System which is a complete treatment process akin to activated sludge, the Degritting Clarifier and Clarigester and the DorrClone Classifier as applied to sewage degritting have already been commercially proven at plants in the western U. S. First installations of the CompleTreator, a package plant to serve a population of 150, are now operating with some 30 additional units scheduled to start up in 1958.

Our subsidiary in the Netherlands has marketed equipment for facilities as far distant as Norway, Iraq and India, while new or enlarged D-O equipped domestic installations sold in 1957 can be found from New York City to Los Angeles and San Antonio, Texas to Fairmont, Minnesota.

GENERAL METALLURGICAL — Applications of the DSM Screen, first introduced in 1956, continued to grow in virtually every field we serve. One of the most promising has been magnetite recovery in heavy media cyclone plants on the Mesabi Range. Also new is the swing-type agitator for the American Filter — a development particularly applicable to filtration of heavy metallurgical slurries.

Following the trend noted in previous years, widespread acceptance of the Slurry Mixer by the cement industry and the Thickener — American Filter combination by the coal industry continued again last year. In Germany, France, India and Australia flue dust clarification and recovery contributed materially to our business and in Canada a substantial volume of Dorr-Oliver-Long shaft equipment and mine cars was purchased for underground mines.

PLANT ENGINEERING—At the year's end, design of a granular fertilizer plant for India and sections of a new Cuban nickel recovery plant were partially completed, and construction of three D-O designed phosphoric acid or fertilizer plants was progressing in Venezuela, England and Montana. During the year a 200,000 ton per year triple superphosphate plant in Florida and a Norwegian phosphoric acid installation were put into operation and brought up to design capacity in near record time.

FLUOSOLIDS SYSTEMS — Also in the fertilizer industry two western producers ordered the first FluoSolids Systems to be used for calcination of phosphate rock. Designed to handle a total of 1,500 tons per day, these installations were the direct result of successful field tests using a portable fluidized bed pilot plant. During the year other FluoSolids Systems were ordered to dry limestone and blast furnace slag in the U. S., roast copper matte in Belgium, calcine clay in Scotland, decompose copperas in England, and roast pyrite for a Japanese paper mill and an Italian sulfuric acid manufacturer.

The largest FluoSolids System for fine coal drying, handling over 600 tons per hour, went into operation during the third quarter at a new eastern preparation plant, and construction is nearing completion on a second similar, but smaller, installation. In the realm of unusual applications is a unit drying a highly-corrosive chlorinated hydrate at an eastern chemical plant.

WATER TREATMENT — In the southwestern United States the DorrClone Classifier has been used with notable success for the desanding of municipal well water supplies. For small plants the PeriFilter System with a single pre-treatment unit and split filter provides economical unitized water treatment.

Major expansions of the Louisville, Kentucky and Fort Worth, Texas treatment facilities will be D-O equipped as will new municipal plants at Springfield, Ohio; Peoria, Illinois; and Delhi, India. New industrial treatment installations will serve pulp mills in South Carolina, India and Venezuela and an Indian fertilizer plant.

PETROLEUM — Another modification of the familiar DorrClone Classifier is the Clay-Jector, latest development for control of drill mud weights. Noteworthy economies are possible using this unit which mechanically rejects undesirable drilled solids while recovering valuable barites for reuse.

CHEMICAL — A substantial amount of D-O equipment of all types has been incorporated into the unique flowsheet of a new astrakanite recovery plant in the Chilean nitrate fields. In Germany and the United States, Horizontal Filters have been widely applied to dewatering and washing of fine organics as well as highly corrosive inorganics, and around the world filters of both standard and special construction were ordered for an almost endless variety of services.

COPPER AND URANIUM—Last year substantial amounts of D-O processing equipment were purchased for new and enlarged copper mills in South America, Mexico, the Belgian Congo and United States and new uranium mills in Australia, United States and Canada. A new and improved design and method of fabrication of stainless steel rake Classifier blades was developed. Although conceived initially for the uranium industry this design is broadly applicable to classifications involving corrosive solutions. Certainly no summary of 1957 accomplishments would be complete without mention of the Chemical Engineering Achievement Award presented last month to a group of companies including Dorr-Oliver for their contribution to extractive metallurgy of atomic age metals. Interestingly enough, D-O was one of the very few engineering equipment organizations selected for the award.

With several years of expansion and enormous activity behind us, the current business plateau provides a much needed opportunity to consolidate and catch our breath. The real challenge will be to increase the spread between income and outgo through more efficient operation — while accelerating the rate of our technological advances. I am confident we can, and will, do both.

J. D. Hitch, Jr.
President

November 18, 1957

DorrClone, FluoSolids, PeriFilter and RapiDorr T.M. Reg. U. S. Pat. Off.

NO REBORING—

NO KEYSEATING—

NO MACHINING—

NO WAITING!

TAPER-LOCK SPROCKETS
SINGLE AND DOUBLE STRAND!

NOW Taper-Lock *Double* Strand Sprockets are available—from stock—ready for the shaft without re-machining!

They offer all the advantages of Taper-Lock mounting. Easy on! Easy off! Precision machined at the factory, they come to you with accurate, concentric bores —insuring full contact between hub and shaft. Taper-Lock grips with the firmness of a shrunk-on fit!

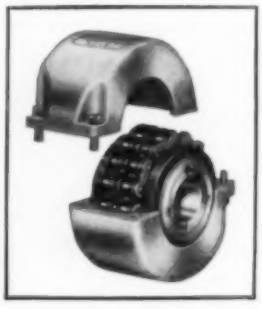
There is no flange, no collar, no protruding part. Flush design means *safety*... If the sprocket becomes worn, you replace only the tooth part. The bushing is used again and again. And Taper-Lock bushings are interchangeable in Dodge Taper-Lock Sheaves, Couplings and Conveyor Pulleys!

Taper-Lock Sprockets and Dodge Roller Chain (made to ASA standards) are stocked by Dodge distributors. Single Strand sizes range from No. 40 to No. 160, up to 112 teeth; Double Strand from No. 40-2 to 80-2, up to 102 teeth. Write for Bulletin A-644 containing selection, installation and maintenance data.

DODGE MANUFACTURING CORPORATION
3000 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



TAPER-LOCK CHAIN COUPLINGS

Accommodates common minor shaft misalignments. Provides strong, compact coupling. Available with covers, for appearance, safety, dirt protection and lubrication—which increases coupling life.

FREE EXPERT ADVICE for WIRE ROPE USERS

5 Wire Rope Recommendation Booklets for Better Service, Longer Life

Here, in non-technical language, are detailed wire rope recommendations for 5 important fields. And they're from the best possible source—the wire rope engineers of the American Chain and Cable Company who have been responsible for such technological triumphs as the development of TRU-LAY Preformed wire rope and the new extra strength TRU-LAY VHS.

Written in easy-to-understand form, these new booklets are from 8 to 24 pages long and contain specific recommendations as to size, grade and construction of wire rope best suited for each specific use. Following these instructions will result in better service and longer life on all your wire rope applications.

In addition, there is a page of TRU-LAY wire rope characteristics which explains fully the basic terms of diameter, construction, lay, grade and core . . . all necessary in understanding wire rope nomenclature. Many pictures of equipment at work also help the reader to visualize how recommended wire ropes are used on the job.

To receive copies of any or all of the 5 free wire rope recommendation booklets, simply fill in the coupon with the information requested.

AMERICAN CABLE DIVISION, Wilkes-Barre, Pennsylvania

Please forward the material checked below:

☐ Mining Industries—**DH-128-A** ☐ Marine Services—**DH-128-C**

☐ General Contractors—**DH-128-B** ☐ Industrial Services—**DH-128-D**

☐ Logging Operations—**DH-128-E**

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AMERICAN CHAIN & CABLE

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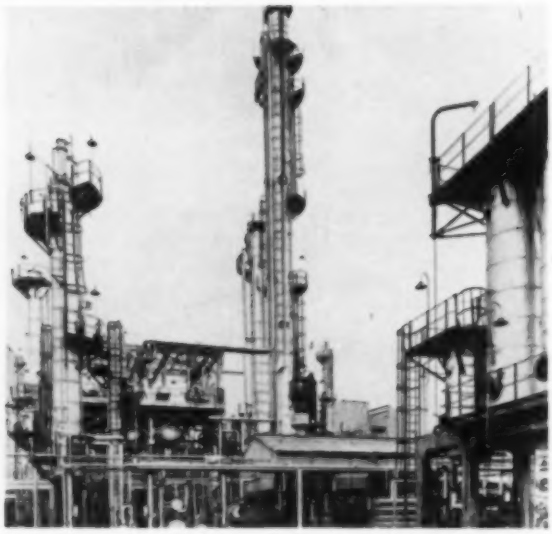
ACCO TRADE MARK

COAL AGE

News Roundup



Pure Coal Chemicals

A light oil containing pure high grade benzene, toluene and xylene, produced from the coking of coal to make metallurgical coke for blast furnaces, is now obtainable says Jones & Laughlin Steel Corp. A new plant at J&L's Aliquippa, (Pa.) works reports that the purity of the oil products exceeds the requirements of standard specifications of the chemical and allied industries. Coal chemicals of this higher quality are in demand for making many products, including synthetic fibers, synthetic rubber, insecticides, dyes, drugs and other chemicals.

Using the "Hydrofining" process, a catalyst is employed to promote a reaction between contaminating sulfur compounds and hydrogen. The hydrogen also combines with non-aromatics in the oil to produce compounds that can be separated out in the "Udex" process. With advance distillation techniques, J&L states that it is able to separate benzene, toluene and xylene as high-purity products without making intermediate materials. Purity of the final products is indicated by the fact that sulfur compounds are reduced to less than one part per million. The plant has a rated capacity of 55,000 gal per day of light oil.

Gas Struggle Enters Middle Rounds

Rooters have begun to guess at the scorecards of the judges, and through the smokey air, it appears that coal may be getting in some of the sharper punches in the natural gas fight. Both contestants have displayed some of their fanciest footwork, but it seems that in several instances, gas has been unable to dodge the issues.

Here's a brief recap of the picture. Midwestern Gas Transmission Co., an affiliate of the big Tennessee Gas Transmission Co., applied to the Federal Power Commission for a permit to operate a pipeline from the international boundary near Emerson, Manitoba, to a point near Portland, Tenn. The line would run through Minnesota, Wisconsin, North Dakota, Illinois, Indiana, Kentucky and Tennessee. To supply this pipeline, Midwestern proposed to buy up to 204,000,000 cu ft of gas daily from Trans-Canada Pipe Lines, at the northern terminus of the hookup, and an equal amount from Tennessee Gas Transmission Co., at Portland, Tenn.

Quickly, a host of opponents set out to block the proposal. The National Coal Association and the Anthracite Institute came to the defense of coal, claiming that such a pipeline would drastically harm coal economy. The United Mine Workers and other labor interests, fearing wide-scale unemployment, piled into the ring. Shipping interests, worried about loss of business at the docks claimed that over 50% of their trade could be cut if the move were permitted; and various railroads joined the block in defense of their freight trade.

A hoard of witnesses has been brought before the FPC to apply the brakes to gas's runaway plan. Three of the major defenses offered are: that the applicants do not have an assured supply of gas from Canada and cannot finance the line on the basis of its present supply; that the proposal is designed so as to underprice coal, and that **in view of an overrall economic picture, the move would not be in the public interest.** An example given here is the "take or pay" gas supply contract which is forced upon pipelines and distributors who must dispose of surplus gas to industrials at give-away prices in order to mitigate losses. Moreover, the two-part rate device enabes pipelines to load disproportionately high demand charges on domestic and commercial customers while offering discriminatively low commodity rates to industrial users. Such marketing practices can drive out competing fuels, relegate coal to the untenable role of a standby fuel, and needlessly accelerate the depletion of the limited supplies of natural gas in the United States.

The key to the situation may be the Harris-O'Hara Natural Gas Bill which will come before congress in 1958. This bill is said to continue imperfections in present law which have contributed materially to coal's loss of position in the competitive energy markets. Present laws makes no provision for regulation of direct sales by pipelines to industrial consumers, thus, the pipeline industry enjoys monopoly advantages in the market it serves. It is a public utility legally, but it is only partially regulated, and coal interests claim that if the pipelines want and have privileges of a utility, they should be wholly, not partially controlled.

The Harris bill is described as no solution to the problem. It provides additional benefits for gas producers, pipelines and distributors without requiring them to give up any competitive advantages. The bill would, claim opposers, add incentives for further exploration and development and make greater quantities of gas available from new and existing reserves, increasing dumping of gas at unrealistically low prices. It ignores the

In This Section

People in Coal	p 30
Equipment Approvals	p 36
Preparation Facilities	p 37
Mining Techniques	p 38
Acid Control	p 42
Coal Abroad	p 43
New Books	p 48
Current Coal Patents	p 52
Mines and Companies	p 56
Accidents	p 58
Utilization	p 58
Transportation	p 60

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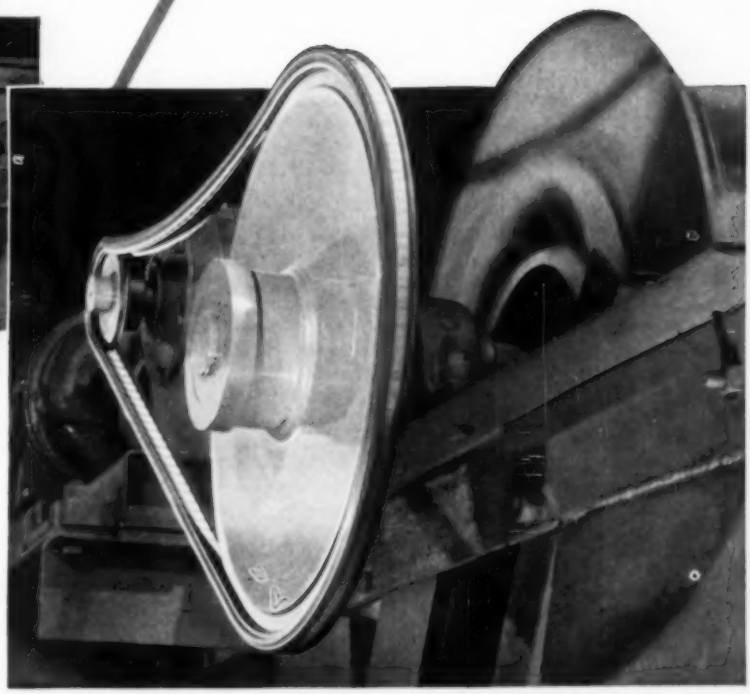
RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing.

it's *dynamic strength*

in LINK-BELT Roller Chain that fights fatigue

ON high-speed drives or heavy conveying jobs, the components of every pitch of roller chain face severe and repeated operating stresses—engagement with sprockets, shock of starting loads, centrifugal loads and others. That's why *dynamic strength*—ability of chain to resist these stresses—is so important. And it's built into *every length* of Link-Belt Precision Steel Roller Chain.

How is dynamic strength developed? In addition to Link-Belt "extras" . . . special design, manufacturing and processing steps provide required properties of uniformity and accuracy for long-life operation.

Talk over your roller chain needs at your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Book 2457, covering this complete line of single and multiple widths, in ¼ to 3-inch standard pitch, 1 to 3-inch double pitch. 14,272

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ROLLER CHAINS & SPROCKETS

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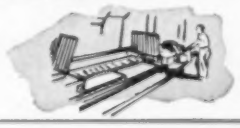
PRE-STRESSING of multiple width chain provides uniform load distribution.



SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL —coupled with rigid testing insures uniformity.

LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo. Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa).

recommendation of the Presidential Advisory Committee on Energy Supplies and Resources Policy, issued February 26, 1955, which states ". . . that appropriate action be taken that will prohibit sales by interstate pipelines either for resale on direct consumption, which drive out competing fuels because the charges are below actual cost plus a fair proportion of fixed charges."

Why do ringsiders feel that coal may get the nod? Firstly, Prime Minister Diefenbaker took a round away from natural gas by saying that he was not sure that Canada would even sell gas to Midwestern and that a royal advisory group would have to study the problem before any decision could be made. Secondly, President Eisenhower has already vetoed a similar Harris bill in the wake of lobby scandals in 1956. Thirdly, a spokesman for White, Weld & Co.—underwriter for both the Trans-Canada and the MGT projects—told an FPC examiner that the MGT project cannot be financed until Diefenbaker either issues a "clear statement" affirming the previous export commitment, or the royal commission itself does, and this would appear unlikely. Finally, Representative Oren Harris, chairman of the House Commerce Committee and co-author of the bill, is said to have strong doubts that the measure can pass the house next year unless some compromise is made. Coal, however, is standing pat, and gas has refused to make any concessions, so attempts at compromise have just about collapsed. How does that leave the judges' scorecards at the final bell? Coal's not talking while the advantage lasts.

Mining Men Guilty

George Wesley and Stanley Cupsenski of Loomis Colliery, Glen Alden Corp., have been given suspended sentences by Judge Thomas M. Lewis. They were found guilty of violating a "technical" law which requires that every 60 ft in the mining process, a "crosscut" or opening between underground mining chambers, be driven. The two men admit that they had no authority in law but used only what they considered to be sound mining judgment, in exceeding the legal distance. They explained to the judge that they exceeded the statutory distance because at the 1,300-ft depth, the pillars in the mines would not support the pressure at "that particular place."

Reactor Contract

The first contract under the Power Demonstration Reactor Program has been negotiated between the Atomic Energy Commission, which initiated the program, and the Northern States Power Co., Minneapolis, Minn. The contract provides that the company will build at its own expense a nuclear power plant of an advanced boiling water type, which will be fueled with an enriched uranium. The plant, which is to be located at a site arranged by the utility company, will have a net electrical capacity of 66,000 kw, and will be operated by Northern State for the first 5 yr. Estimated cost is about $28,000,000, about $6,000,000 of which, will be contributed by the AEC. In addition to this, the commission will waive fuel use charges up to $1,000,000.

The Northern States Power Co. and ten other electric utility companies in the MidWest have formed a non-profit corporation known as Central Utilities Atomic Power Associates (CUAPA). The ten other companies in the group will contribute a total of $3,650,000 toward research and development costs. In return, it is said, the firms will receive technical information developed in the project and their personnel will receive training in nuclear power plant technology. Completion of the reactor is expected in June, 1962.

Explosion Findings

The Bureau of Mines of the Dept. of Interior has announced that an explosion that fatally injured six men in the Marianna No. 58 mine of Bethlehem Mines Corp., was caused by the ignition of gas by an electric ark or spark from a work "jeep" or from a trolley wire cutout switch. The blast occurred following the failure of one of the mine's two ventilating fans. Because of the fan stoppage, the mine was idle and only 11 men were underground. Most of these were mine officials checking the ventilation system.

Coal-Land Sale

Seventy thousand acres of coal and timberlands located in Leslie, Clay, Bell and Harlan Counties, have been sold by Ford Motor Co. to Potomac Industries of Washington, D.C., it was announced recently. Fordson Coal Co., a subsidiary of Ford Motor Co., retains gas and oil rights on all acreage sold, along with coal and mineral rights on 10,000 acres. Potomac gets mineral rights, including coal rights, on about 60,000 acres. Ford will continue to control 30,000 acres in Pike County, devoted to coal mining and which helps to supply coal to Ford coke ovens in Michigan. Ford has been alleged to have paid $2,500,000 for its eastern Kentucky holdings in 1925, and it is also understood that the properties were assessed on a million dollar basis for taxes.

Coal Research

Soon, a large research center, brainchild of the bituminous coal industry's major coal users, and companies which supply materials and equipment to the coal industry, will be springing up in Pittsburgh, Pa. Dr. A. A. Potter, president of Bituminous Coal Research, Inc., which will be responsible for operating the new facility, has said that the development climaxes months of cooperative planning by executives of the coal industry and major Pittsburgh industrial companies, which have indicated that they would lend capital support to the plan.

The plan is to consolidate the industry's research facilities in the Pittsburgh area. The consolidation will combine the present coal-industry operated laboratory in Columbus, Ohio, the laboratory and administrative headquarters in Pittsburgh, Pa., and the organization's fiscal offices, now located in Washington, D. C.

The bituminous coal research center, according to the Regional Industrial Development Corp., will be an important unit in the industrial research frontier, comprising about 80 research laboratories, and will place emphasis on study of preparation, transportation, handling and storage of coal; its use as electric utility fuel; and more efficient utilization in the production of industrial steam, and for space heating. Research will also be conducted in the fields of gasification, chemical and other process uses of coal. The center will be not only for the coal industry, but for governmental groups, educational institutions, and for those industries which will profit by the development of improved methods and processes of handling and using coal.

Coal to Gas

Engineers at Columbia University are working on converting coal into synthetic natural gas, consisting mostly of methane. Coal is heated and pressurized under radiation from the mineral, cobalt. Radiation helps to convert the coal by catalyzing the break-down process, which occurs when hydrogen gas is introduced. This so-called hydrogenation reaction creates the gas. It has been indicated that it might be 20 yr before the system is practical.

Continued on p 56

IT'S AMOCO ALL THE WAY
AT THE BRIDGEVIEW COAL COMPANY!

Another mining company that lubricates exclusively with Amoco!
Mining equipment has become more and more specialized with every passing year. And of necessity, so has lubrication.To get the best lubricant for every job, the Bridgeview Coal Company uses Amoco Lubricants right down the line: Amoco Superior Diesel Oil S-3, Amoco HDX Oil, Amotorque Fluid and Amoco Greases, as well as Amoco Fuel Oil.

Why choose Amoco over all others? Because a piece of machinery is only as good as the lubricants that keep it operating! And Amoco Lubricants are the best!

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HIGHER QUALITY...FOR BETTER LUBRICATION...AT LOWER COST

People in Coal

Time to Relax

Luther C. Campbell, who retired after 42 yr in industry, built a reputation as a leader and humanitarian. Vice president of Eastern Gas & Fuel Associates, with whom he was affiliated for 30 yr, he also was management representative on the Coal Mine Inspection Advisory Committee, chairman of the coal division of the American Mining Congress and head of the National Coal Safety Committee.

Graduated from Penn State University in 1915 with a degree in Mining Engineering, Mr. Campbell was first employed in 1915 as superintendent for Rand Mining Co., a gold and silver mining organization in Nevada. Following a hitch as a Lieutenant in World War I, he became superintendent of coal mining operations at McKinney Steel Co., in Pike County, Ky., and later transferred to Eastern Gas & Fuel, with whom he has been till now.

Mr. Campbell's devoted efforts in social work led to the construction of a hospital at Pikeville, Ky., for miners and their families, one of the earliest hospitals in the coal fields of the United States. Besides helping to establish a nursing clinic and supervising efforts to increase mine safety, he was for years teacher of a Bible class in a Mount Lebanon, Pa., church. Mr. Campbell, who makes his home at 393 Parker Drive, Mount Lebanon, Pittsburgh, Pa., has two sons who are college graduates and established in business and industry. Though relaxation is his aim, Luther Campbell's interest in people will undoubtably not slacken.

Oscar A. Glaeser, former vice president of U. S. Fuel Co., has been elected president of the firm, succeeding **F. S. Mulock,** now chairman of the board. Mr. Glaeser started with the organization over 21 yr ago as safety and ventilation engineer. He became successively, industrial relations manager, assistant to the vice president and general manager and assistant general manager. In August, 1954, he was elevated to the position he has held until this new appointment.

George S. McCaa, mine inspector, Bituminous Coal Mining Div., Pennsylvania Dept. of Mines & Mineral Industries, retired recently. Mr. McCaa, considered an authority on mine fires, explosions and rescue work, was an outstanding athlete at Lafayette College, where he combined this attribute with excellent scholastic achievements. He established an excellent record with the Bureau of Mines, designing a self-contained oxygen-breathing apparatus which still bears his name. He also authored technical publications on ventilation, rock dusting, mine rescue and the extinguishment of mine fires.

J. W. Woomer was nominated as president-elect of the Society of Mining Engineers for 1958. If elected, Mr. Woomer, who heads the consulting firm of J. W. Woomer & Associates, will become president of SME in 1959. Mr. Woomer has travelled to many parts of the world on consulting activities, and has been affiliated with both Pittsburgh Coal Co. and Hanna Coal Co.

Clinton C. Cornelius, who was recently made general manager of United States Fuel Co., is a graduate of Pennsylvania State College in Mining Engineering. He has been associated with Pittsburgh Consolidation Coal Co., Valley Camp Coal Co., and as vice president of the Baton coal interests, has directed operations of the Greensburg-

How Farval lubrication saves labor, eliminates bearing troubles on power shovels

FARVAL—
Studies in Centralized Lubrication No. 156

WATCH a power shovel tear into rock, slate, gravel, or dirt. It's dig, hoist, swing, dump—over and over again, hour after hour, day after day. Work like this soon ruins improperly lubricated bearings. That's why it pays to install the Farval Centralized System of Lubrication on quarry and mine shovels like the one shown.

It takes just a minute or two, even on a big six-yard shovel like the Bucyrus-Erie 150-B, for Farval to lubricate every bearing needing protection for heavy duty. Compare this to stopping the shovel for 15 to 20 minutes each time the operator needs to lubricate by hand—and then he has to climb around looking for grease fittings.

FARVAL FIGHTS FRICTION

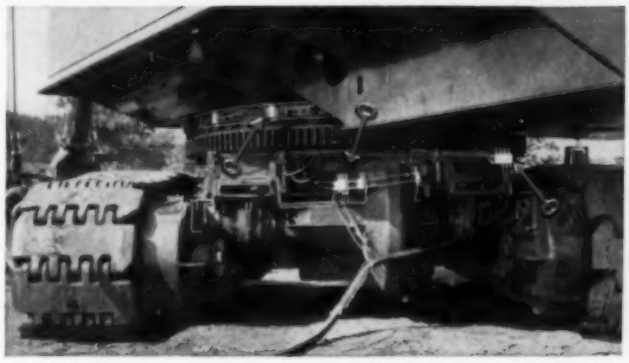
Farval delivers any oil or grease that can be pumped under pressure to any number of bearings from one central station, in exact quantities, as often as desired. The rugged Farval valve has only two moving parts—is simple and sure. No uncertain springs, ball-checks or pinhole ports to cause trouble. Any grit, abrasive sand or dust that has penetrated the bearings is forced out by the measured injections of lubricant, and the lubricant forms a protective seal. Hazards due to hit-and-miss hand lubrication are eliminated.

FARVAL SAVES MAN HOURS, LUBRICANT

Experience shows that Farval saves as much as 45 minutes of each hour of oiling labor—up to 3 of every 4 pounds of lubricant consumed by other methods.

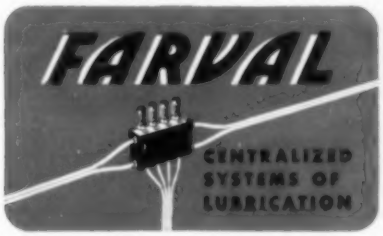
If you make or use power shovels, conveyors, crushers, shaker screens, elevators or other heavy equipment, your machines will run longer and produce more if you install Farval. Farval protects millions of bearings throughout industry. Write now for Bulletin 26. The Farval Corporation, 3288 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine will be properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Pictured is the Farval-lubricated truck frame of a Model 150-B six cubic yard power shovel. Photo courtesy of Bucyrus-Erie Company.



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FLOOD CITY Bronze Parts are best . . . best fitting . . . best wearing . . . all expertly machined from the best grade of hard, wear-resistant bronze or to your particular specification bronze.

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People in Coal *(Continued)*

Connellsville Coal & Coke Co., Farmer Coal Co., Joanna Coal Co., and Carpenter Coal & Coke Co. Mr. Cornelius is married and has two boys, ages 14 and 11. His family will join him in Salt Lake City, his new headquarters.

A. VERNON SPROLES

P. P. FERRETTI

A. Vernon Sproles was elected executive vice president of Pocahontas Fuel Co. and **P. P. Ferretti** was elected vice president in charge of operations, succeeding Mr. Sproles. Mr. Sproles is a veteran of over 48 yr service with Pocahontas and a predecessor company. He became vice president in April, 1954, after serving 10 yr as general superintendent of mines. Mr. Ferretti has been with the organization since 1952 serving in several capacities until his new appointment. He is succeeded as general superintendent of mines by **Irwin W. Sampson,** with Pocahontas since 1954. Mr. Sampson was formerly a division director.

Eugene Moroni, Madisonville, Ky., was named president of the Western Kentucky Coal Institute, an organization composed of mine superintendents, foremen and entry foremen of mines in Hopkins, Christian, Ohio, Union, Webster and Muhlenburg counties of Western Kentucky. Mr. Moroni is general superintendent of the Bell & Zoller Coal Co. operations.

Otto Gressens, executive vice president, Peabody Coal Co., was elected president and director of Fuels Research Council at the annual membership meeting in New York. **Fred K. Prosser,** general coal traffic manager, Norfolk & Western Ry., was named vice president and director of the corporation, to succeed the late Charles A. Owen. **R. E. L. Hall,** NCA general counsel, was re-elected secretary and **Tom Howarth,** NCA controller, was elected treasurer.

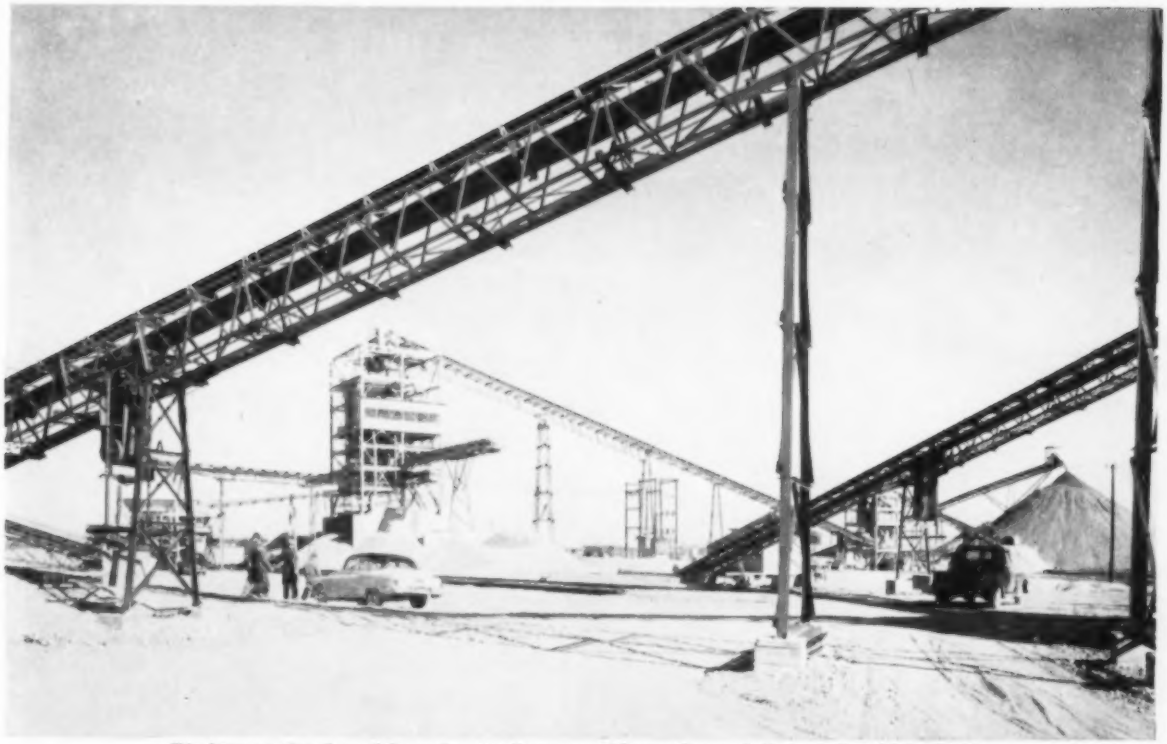
Along with the new research plan, p28, came the announcement of three promotions in the structure of BCR, effective January 1, 1958. They are: **Dr. Harold J. Rose,** who will become vice president and consultant; **J. R. Garvey,** who will be director of research; and **John W. Igoe,** who assumes the position of director of administration. The three men are members of the staff planning group which administers policies of the coal industry's cooperative research program within the range of activities authorized by the organization's board of directors.

The following officers, directors and committee members were elected at the annual meeting of the Southern Appalachian Coal Operators' Association. Officers were: **C. R. Griffith,** president; **W. S. Webster,** first vice president; **Fred Loving Jr.,** alternate; **P. B. C. Smith,** second vice president; **H. S. Homan,** executive secretary & treasurer.

Directors are: **Lindsay Young,** Garland Coal Co.; **R. H. Hughes,** Clinchfield Coal Co.; **Ray S. Walker,** Laddie Coal & Mining Co.; **W. C. Hutcheson** Wind Rock Coal & Coke Co. **Warren Haydon,** alternate; **E. F. Wright,** Clinchfield Coal Co.; **C. J. Potter,** Rochester & Pittsburgh Coal Co.; **J. O. Archer,** Blue Diamond Coal Co.; **W. T. Ray,** Meadow Creek Coal Co.; **D. R. Christian,** Beach Grove Mining Co.

Obituaries

George C. McFadden, 69, died December 1st in an Evanston, Ill. hospital. Mr. McFadden was a principal and vice-president of Paul Weir Co., and had been with them for 18 yr. He began his coal mining career in Danville, Ill., at the age of 18.



This shows a portion of one of the year's outstanding conveyor jobs . . . Consumer's Company, Crystal Lake, Illinois.

It's not true that Barber-Greene invented the belt conveyor

. . . but it is true that Barber-Greene introduced the greatest advance in belt conveyors since their invention —*standardization.*

Before Barber-Greene entered the field in 1916, belt conveyors were economical on paper—costly to build. Most installations were tailor-made, involving slow single-unit production . . . expensive field engineering . . . complicated assembly.

Then Barber-Greene developed a unique system of standardized conveyor components that quickly outdated ordinary methods of erection, operation and maintenance. Soon standardized conveyors were known for:

Faster delivery. Packaged units come from dealer stock or are immediately available from the factory.

Low-cost erection. Conveyors get into operation sooner with big savings in engineering costs.

Unmatched flexibility. Interchangeable parts simplify lengthening or shortening of conveyors to meet changing needs.

Today, standardized components are practical for installations of nearly every length, width and capacity. Wherever used, they give a new meaning to conveyor economy, utility and flexibility.

Drives, take-ups and similar units are completely assembled, aligned and adjusted by experts at the factory to assure trouble-free operation.

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CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

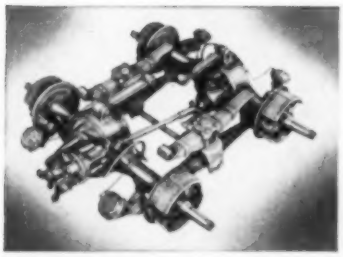
INTERNATIONAL six-wheelers cover the range from 22,000 lbs. GVW to 76,000 lbs. GCW in conventional and COE design. There is one practically custom-built for every hauling job in the world's most complete truck line. Widest choice of load-moving and load-carrying components to keep operating and maintenance cost lowest.

INTERNATIONAL **four-wheel-drive pickups** are all-truck built to give you the extra traction and pull to meet the toughest requirements. Extra wide seats allow plenty of elbow room for three big men. And remember, you get the most powerful "six" in its class.

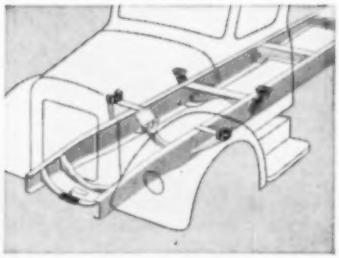
INTERNATIONAL TRUCKS

Longer Tandem Life

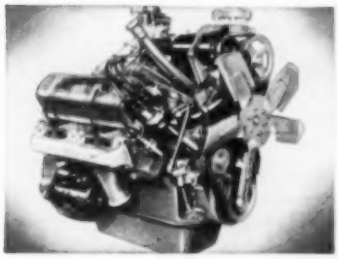
Just one reason why you'll find International Trucks cost least to own!



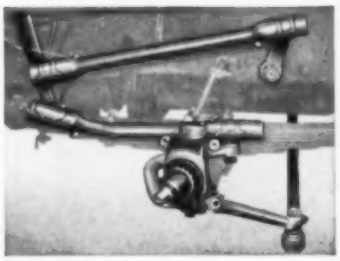
Plenty of pull on- and off-highway with sturdy, long lasting tandems. You get extra flotation, positive traction always.



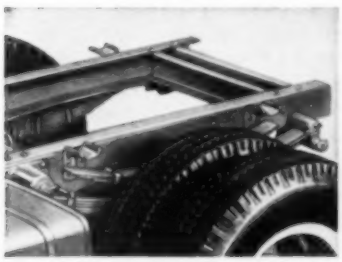
Cabs last longer even in the most severe operations with exclusive 5-point mountings. Quieter, easier riding, too.



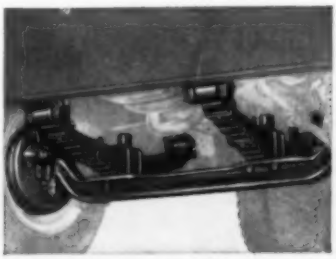
Save time, save money with the most powerful V-8's you can get—to 549 cu. in. Other power plants to 356 hp.



Easy to handle even in tightest spots with true geometric steering, cam and roller-mounted steering gears.



Plenty of strength for the toughest jobs and biggest loads with frames that have extra rigidity with proper flexibility.



Maximum load and life with choice of heavy-duty, heat treated high carbon steel axles to meet exact hauling needs.

Tough on- and off-highway jobs require tandems and all other parts that are built to stand up and take it . . . that will keep operation and maintenance costs 'way down.

And that's the way INTERNATIONALS are built. Cost records prove* this all-important fact – INTERNATIONAL Trucks cost *least* to own.

This superiority doesn't just happen. It's the result of INTERNATIONAL'S rigid policy to build trucks that will do the job better, do it longer and at least cost.

Why not follow the lead of men who know truck costs to the penny – men who have made INTERNATIONAL six-wheelers the sales leader for the past 22 straight years. Make your next truck an INTERNATIONAL.

**Signed statements in our files, from fleet operators throughout the U.S., back up this statement.*

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Construction Equipment • McCormick®
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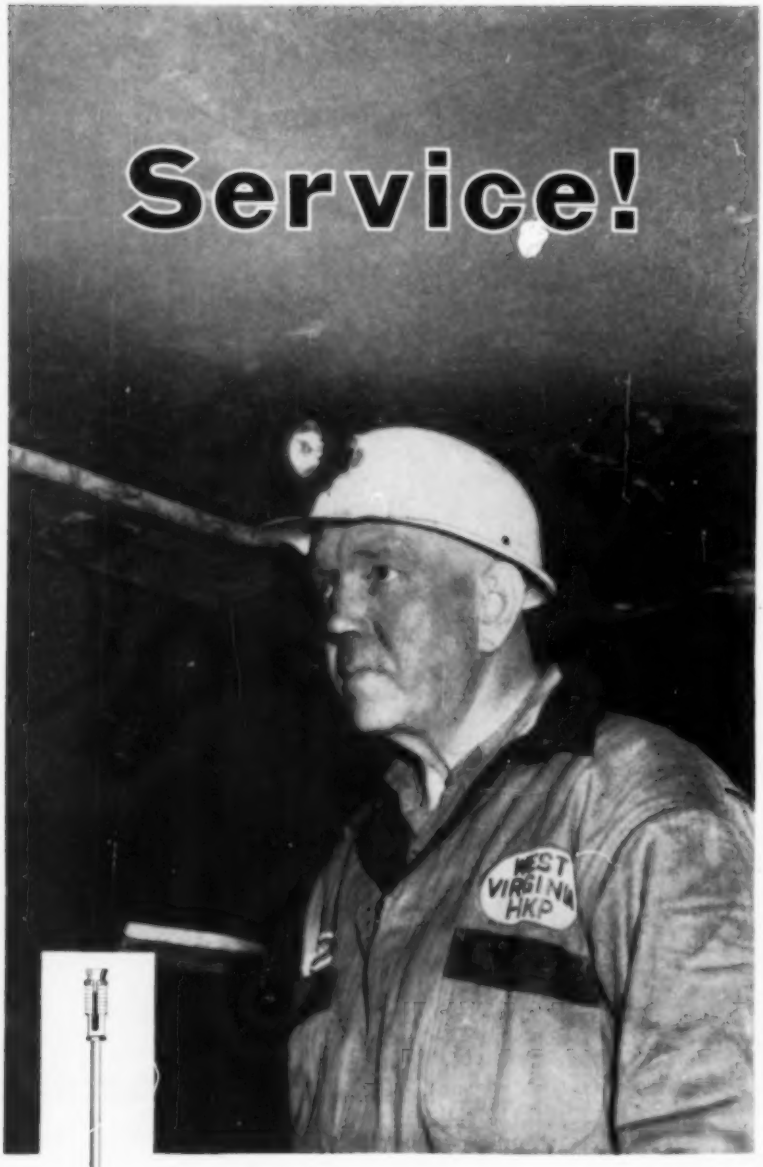

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West Virginia Roof Bolts

Need assistance in solving difficult roof-bolting problems? Want maximum safety, easier installation and prompt deliveries of roof bolts? Write Connors Steel Division, P. O. Box 158, Huntington, West Virginia or call JAckson 9-7174 for service you will like . . . quality you can trust.

"Service and Quality"

H. K. PORTER COMPANY, INC.

CONNORS STEEL DIVISION

Equipment Approvals

Thirteen approvals were issued during November.

Joy Mfg. Co.—Type 1CM-3BF continuous miner with roof-bolting drill; nine motors, two 7½ hp, two 10 hp, one 15 hp, one 26 hp, two 100 hp and one 3 hp, 500 V, DC. Approval 2-1241 A, Nov 22. (Approval 2-1241 covering 250-V miners of this type was issued May 2, 1957.)

Joy Mfg. Co.—Type 18HRS-1KK hard rock loading machine; three motors, one 75 hp, one 4 hp, and one 7½ hp, 550 V, AC. Approval 2-1305A, Nov. 5.

The Long Co.—Types M130 and M136 mobile conveyors; one motor, 25 hp, 230 V, DC. Approval 2-1306, Nov. 5.

Joy Mfg. Co.—Types 14BU-8AN and 14BU8BN loading machines; five motors, two 15 hp, one 4 hp and two 7½ hp, 500 V, AC. Approval 2-1307A, Nov. 6.

Wilcox Mfg. Co.—Type WEC-26-DC extensible chain conveyor; one motor, 10 hp, 230 V, DC. Approval 2-1308, Nov. 7.

Wilcox Mfg. Co.—Type WEC-26-AC extensible chain conveyor; one motor, 7½ hp, 440 V, AC. Approval 2-1309A, Nov. 8.

Acme Mfg. Co.—Model 275TAC compressor; one motor, 75 hp, 550 V, AC. Approval 2-1310A, Nov. 12.

Joy Mfg. Co.—Types 9SC2BPE-3, 9SC2BPXE-3 cable reel shuttle cars, three motors, each 15 hp, 250 V, DC. Approval 2-1311, Nov. 15.

The Jeffrey Mfg. Co.—Type ML-81-AH loader; five motors, four 15 hp and one 4 hp, 250 V, DC. Approval 2-1312, Nov. 18.

Lee-Norse Co.—Model CM37-1E miner; three motors, each 50 hp, 440 V, AC. Approval 2-1313A, Nov. 25.

The Jeffrey Mfg. Co.—Hydraulic power unit; one motor, 10 hp, 250 V, DC. Approval 2-1314, Nov. 26.

Waukesha Sales and Service Co.—Model WJ180 utility truck for use in noncoal mines. Approval 2412, Nov. 6.

Getman Brothers—Models CD-3N and CD-4 ore carrier for use in noncoal mines. Approval 2413, Nov. 18.

(*Continued on p 173*)

Preparation Facilities

Jewell Ridge Coal Co., Jewell Valley, Va.—Contract closed with Western Machinery Co. for combination Wemco HMS plant with 12x12 drum-type separator, Deister tables for fines. Capacity 300 tph. Scheduled completion of installation, December, 1957.

Hanna Coal Co., Georgetown preparation plant, Cadiz, Ohio—Contract closed with Western Machinery Co. for Wemco 66-in Fagergren pipe flotation plant. Capacity 50 tph. Now in operation.

Omar Mining Co., Stirrat, W. Va.—Contract closed with Deister Concentrator Co., Inc., for 20 No. 7 Super Duty Diagonal Deck washing tables, and for two Model 108 Concenco revolving feed distributors.

Weyanoke Coal & Coke Co., Arista, W. Va.—Contract closed with Deister Concentrator Co., Inc., for one Concenco No. 77 Diagonal Deck washing table.

Peerless Coal & Coke Co., Vivian, W. Va.—Contract closed with Deister Concentrator Co., Inc., for one Concenco No. 77 Diagonal Deck washing table.

Clinchfield Coal Co., Moss No. 3 preparation plant, Corbo, Va.—Contract closed with Westinghouse Air Brake Co., Union Switch & Signal Div., for electric-pneumatic car retarders and direct acting switch layouts. The installation will control movement of coal cars, by gravity from a raw-coal dumper.

Alabama Power Co., Gorgas coal mine, High Level, Alabama.—Contract closed with the Deister Machine Co., Inc., for four No. 16 coal washing tables.

Wingert Contracting Co., Sligo, Pa.—Contract closed with the Irvin-McKelvy Co. for a complete preparation plant to clean 150 tph of raw coal. Plant will feature new dense-media separatory vessel in conjunction with screens, pumps, magnetic separators and loading facilities. Completion scheduled for March, 1958.

Elk Creek Coal Co., Hurley, Va.—Contract closed with the Irvin-McKelvy Co. for a complete tipple to handle 250 tph of mine-run coal. Equipment includes Neff & Fry silo, feeder, picking table, slate ejector, crusher, screen, and conveyors. Completion scheduled for December 1, 1957.

Glen Alden Coal Co., Audenried, Pa.—Contract closed with Wilmot En-

(Continued on p 60)

In this mine, slate is separated from coal underground and carried on another Quaker conveyor belt to the slate pile.

For fire-safety and ruggedness underground,

SPECIFY QUAKER FIRE RESISTANT CONVEYOR BELTING U.S.B.M. 28-11

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ROOF BONDING—John Raves (left), National Mines Corp.; J. Allan Brookes, Mather Collieries, retiring CMIA president, and Earl R. Maize, U. S. Bureau of Mines.

PLANNING— D. C. Jones (left), Penn State, CMIA president-elect; George McCaa, Hanna Coal; F. E. Snarr, Freeman Coal; F. R. Zachar, Christopher; J. E. Osmanski, Island Creek.

Coal Mining Institute of America offers two-day program on . . .

Modern Mining Techniques

Today's trends in plant design, in applications of equipment and power, and in personal services are major themes at 71st annual meeting of CMIA, the oldest mining institute in America.

PLANNING A NEW COAL MINE, including all steps from laying out surface facilities to selecting a staff, was the subject of a full technical session offered by four speakers at the 71st annual meeting of the Coal Mining Institute of America at Pittsburgh, Pa., Dec. 12-13. Other techniques described by industry speakers included roof-bonding experiments, application of AC power in working areas, ventilating face areas using auxiliary fans, and selecting and developing safe, efficient supervisors and workers.

At the institute business session the members elected officers for 1958, as follows:

President—D. C. Jones, director, Mineral Industries Extension Services, Pennsylvania State University, University Park, Pa.

Vice presidents—H. C. Rose, president, Pittsburgh Coal Co. Div., Pittsburgh Consolidation Coal Co., Library, Pa.; **J. D. Reilly,** vice president, Hanna Coal Co. Div., Pittsburgh Consolidation Coal Co., Cadiz, Ohio, and **W. E. Hess,** manager of mines, Vesta-Shannopin Div., Jones & Laughlin Steel Co., California, Pa.

Secretary-treasurer—J. M. Lowe, accountant, Emerald Coal & Coke Co., Pittsburgh, Pa., reelected.

In his report to the business session for the institute's vocational training committee, M. D. Cooper, director, mining engineering education, National Coal Association, suggested that the institute take active interest in high school students in mining areas to make them aware of the opportunities for satisfying employment within the industry. Local engineers could visit schools to speak on the industry, mine visits and trips to the American Mining Congress Coal Show could be arranged for interested parties, and science fairs and essay contests might generate interest among the students.

Other possibilities for the institute to consider, Mr. Cooper said, are the establishment of revolving loan funds at colleges and the promotion of technical paper competition among mining students.

INDUSTRY MEETING—
A Special COAL AGE Staff-Written Report

J. Allan Brookes, general manager, Mather Collieries, Mather, Pa., and retiring president of the institute, pointed out to the membership that CMIA is one of the top coal-mining groups in the nation and that each member should take a personal interest in keeping the organization strong and effective. On two of the industry's major problems, safety and efficiency, Mr. Brookes exhorted the group to give first and constant consideration to safety and to continue to strive for increases in overall efficiency.

Concluding event of the opening session was a paper on roof-bonding experiments at Renton mine by John Raves, general superintendent, National Mines Corp., Renton, Pa., and Earl R. Maize, mining health and safety engineer, U. S. Bureau of Mines, Pittsburgh. Mr. Raves presented a description of roof conditions at Renton, where the stratum immediately over the Thick Freeport seam is a thinly-bedded shale showing little evidence of jointing. Failures in roof generally occur on the face course, that is, in places driven N 24 deg E. The breaks consist of shears which generally run parallel to the rib. Thereafter, falls up to 15 ft above the coal occur. Attempts to solve the problem, Mr. Raves explained, included roof bolting with various sizes and lengths of bolts, extensive experimentation with

SAFETY—J. D. Reilly (left), Hanna Coal Co., session chairman and institute vice president, and C. H. Hoch, Coal Mining Section, National Safety Council.

AC POWER—John A. Stachura (left), Enoco Collieries, Inc.; H. C. Rose, Pittsburgh Coal Co., session chairman, and C. L. Sarff, Ireland mine, Hanna Coal Co.

bolting patterns, trials with shear cuts at center and ribs, quartering the face course and other methods.

Mr. Raves pointed out that the company now is engaged in cooperative research in the possibility of bonding the roof layer together to increase beam strength by injecting adhesive resins into the roof under pressure. Mr. Maize's description of the bonding experiments is presented in detail in this issue of *Coal Age* in the feature article beginning on p 116.

Planning Today's Mines

Speakers at the Thursday afternoon session, concentrating on the planning theme, were George McCaa, general manager, Hanna Coal Co., Moundsville, W. Va.; F. Earle Snarr, vice president—operations, Freeman Coal Mining Corp., Chicago, Ill.; Frank R. Zachar, consulting engineer, Christopher Coal Co., Osage, W. Va., and J. E. Osmanski, manager of personnel, Island Creek Coal Co., Holden, W. Va. Session chairman was D. C. Jones, institute president-elect.

Leading off the panel presentation, Mr. McCaa described preparation and grading of the surface at Ireland mine to provide room for a preparation plant and sites for two slopes and three shafts. These operations included the excavation of 70,000 cu yd of material from a hillside to accommodate the plant, and the preparation of open cuts for portals at elevations not below 650 ft to provide safety from possible Ohio River floods.

One of the early steps at Ireland was to install an AC substation, Mr. McCaa pointed out, in explaining that it was decided to drive the slopes by electrical equipment that could later be used inside the mine. Three shafts at the mine

GAS-WELL PILLARS—W. R. Cunningham, deputy secretary, Pa. Dept. of Mines and Mineral Industries.

FACE VENTILATION—W. R. Stahl, mining health and safety engineer, Bureau of Mines, Pittsburgh, Pa.

are from 140 to 160 ft deep. Two airshafts are 16 ft in diameter and a manshaft, which will be equipped with an automatic elevator, is 14 ft in diameter. All were sunk by methods developed by Hanna's stripping engineers, employing a blasthole drill to sink a ring of breaker holes around the shaft perimeter. Blastholes inside this ring were detonated against the relief provided by the outer ring. Mr. McCaa reported a cost of $149.76 per ft for drilling, explosives, excavation and concrete lining. The form for pouring the lining was made of Armco tunnel liners which could be raised in 8-ft lifts as the pour progressed to line 7-ft section up through the shafts. The men poured a 7-ft section per shift.

Slopes were driven by a Joy 18-HR rockloading machine followed up by an extensible belt having a special 100-ft takeup on the surface. The tail section of the belt and the loading machine could be trammed back from the slope face while rounds were being blasted. A carspotting hoist assisted the loader when wet conditions caused trouble in tramming. Mr. McCaa concluded with an estimate that all surface facilities at Ireland should be completed by April, 1958.

Underground Planning

Taking up the subject of underground planning and layout, Mr. Snarr described operations at Orient No. 3 mine, Waltonville, Ill., for which planning was begun 10 yr ago. Mr. Snarr pointed out that for the most part existing coal re-

serves have less favorable mining conditions than those available when mechanization was first introduced. This forces us to plan and develop mines where the coal lies at greater depths or where the seams are thinner. These factors, combined with the doubling or even tripling of capital costs for development today, dictate that new mines have larger coal reserves and longer life to pay out the increased costs.

Speaking on new methods based upon existing conditions, Mr. Snarr explained that Orient No. 3 was one of the first mines in southern Illinois to adopt pillar-recovery operations. This was possible because cover is thick and a hard limestone caprock found in other areas over the No. 6 seam is not present in the Waltonville area. Thus it was possible to design and maintain a flat fracture line.

Furthermore, roof control in development has been helped through the use of boring-type continuous machines which leave arched ribs in the openings. These have provided stability in openings without a need for heavy timbering or roof bolting.

Intermediate haulage has been a problem, Mr. Snarr said, because in pillar recovery work it is sometimes necessary to have a reach of 75 ft from the room center to the gob side of the pillar block being removed. Several methods had been tried, but now the company is working with a homemade "Whatnik," or self-propelled bridge conveyor. The belts on the unit can be extended to a length of 54 ft or retracted to a minimum of 22 ft. It is hoped this will be the desired link that will make the system more nearly continuous.

Coal Preparation Plans

An extensive checklist of points to be considered in planning the coal-preparation phase of a new property was Mr. Zachar's presentation to the members and guests of the institute.

"It costs money to process coal," Mr. Zachar said, "and the coal producer should not be further burdened by pyramiding operating and maintenance costs through lack of attention, for whatever reason, to details, however minute, in the design of the plant."

Raw-coal characteristics—size consist, moisture and washability—are of obvious importance in plant design and equipment selection. Equally important are the qualities to be realized in the plant product. The desired percentage of ash reduction, final moisture and percentage of plant reject also will influence design and selection.

When the decision is made as to what is to be done and by what means these processes will be carried out, there are three basic evaluations to be made against the preliminary decisions: (1) Is the plant as simple as possible, (2) is it flexible and adaptable to change and addition and (3) is its capacity as high as is needed.

Plant product requirements will usually dictate whether the plant washes only coarse coal or washes to zero, Mr. Zachar said, but the choice is not always open to the producer. It should be remembered, however, that capital and operating costs for cleaning minus ⅜-in coal are usually about three times those of the plus ⅜-in product.

Staffing New Mines

"It would be foolish to have done our plant-design job so carefully and then to spoil it all by the usually haphazard kind of staffing that has characterized the coal industry of the past," Mr. Osmanski declared, in presenting the final paper of the Thursday afternoon session.

"No longer can we line up at the drift mouth a couple of dozen likely-looking prospects and select the broad-shouldered, or those who can stand without being propped, or those who can see lighting and hear thunder, or even those who have been laid off at another mine, and hope to formulate in this manner a work team that will attain the tons per man that the cost of our new equipment will demand."

Staffing a new mine does not begin with an analysis of the abilities, adjustment potentials, status needs or personality traits of an individual worker, Mr. Osmanski said, in explaining that staffing begins with the job to be done. Before it is possible to secure an employee who is fitted for a job, it must be clearly known what the job requires of the employee. Therefore, staffing begins with a description of the job tasks and duties. When the job requirements are accurately known, it is relatively simple to specify the qualifications that will be advantageous in the performance of the job.

The listing of these qualifications is the development of a "man specification" for success. To be complete, these specifications should cover the requirements of the worker in terms of experience, training, physical condition, age, personality traits, specific skills and aptitudes or learning capacities, Mr. Osmanski concluded.

AC power in face areas, auxiliary ventilation and the Pennsylvania gas-well regulation act were top themes at the Friday morning session, with H. C. Rose, vice president-elect as chairman. Speakers on AC power were John A. Stachura, general superintendent, Enoco Collieries, Inc., Bruceville, Ind., and C. L. Sarff, chief engineer, Ireland Mine, Hanna Coal Co., Moundsville, W. Va. The subject of auxiliary face ventilation was presented by R. W. Stahl, mining health and safety engineer, USBM, Pittsburgh, and the gas-well act was explained by W. R. Cunningham, deputy secretary, Oil and Gas Div., Pennsylvania Dept. of Mines & Mineral Industries, Harrisburg, Pa.

AC in Face Areas

Holding to actual experience at Enoco, Mr. Stachura reported a number of distinct advantages from the use of AC power in face areas, including the elimination of motor burnouts, lower initial costs and easier underground handling of AC units, easier training of maintenance personnel and longer life from trailing cables. The problem of finding faults in AC cables sometimes requires more time than in DC setups, but the development of better fault detectors promises to solve this one.

On the subject of maintaining AC equipment, Mr. Stachura said that it might be surmized that AC controllers would need a lot of attention because of the enormous peak loads during starting periods. This has not been the case. Three continuous-mining machines at Enoco have produced more than ¾ million tons of coal with only one set of contactor tips being changed in one machine. This change was made during a routine inspection, and the removed tips were returned to stock. During this period, one 50-hp motor on one of the machines was repaired after being damaged when a cooling fan broke and struck the stator.

Enoco also has four Joy 11BU loading machines with 75-hp AC motors which have loaded approximately 4 million tons of coal without a single motor failure. A spare motor is available which has been used on two occasions in the past 8 yr. In one instance the rotor shaft was damaged because the spline became badly worn. In the other, the nut on the rotor shaft came loose and damaged the threads.

In formal discussion, Mr. Sarff said that there was much fretting and worrying in the early stages of AC applications underground, but the problems which led to the fretting and worrying never appeared. One such headache was contactor dropout which it was thought might be a complication. Not a single instance of this has occurred in more than a year of operation.

On starting torque, Mr. Sarff said this problem was solved as soon as continuous miner operators learned that the machine should not be started with the bits in coal. If the head is cleared before stopping, there will be no trouble in starting.

The underground distribution system at Ireland uses a potential of 7,200 V, a natural followup to the successful use of this voltage at the company's stripping operations in eastern Ohio. Ireland uses Type SHD cables, where Enoco uses Type G.

Mr. Sarff also pointed out that the diversity factor should be given careful consideration in selecting substation ca-

(*Continued on p 174*)

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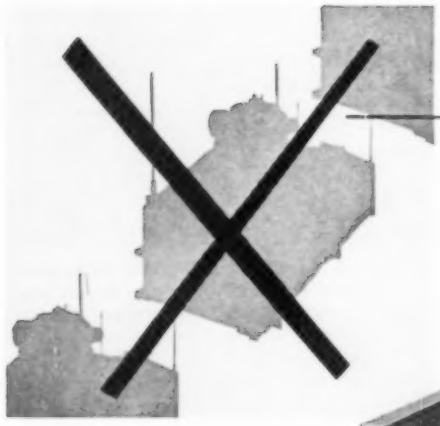

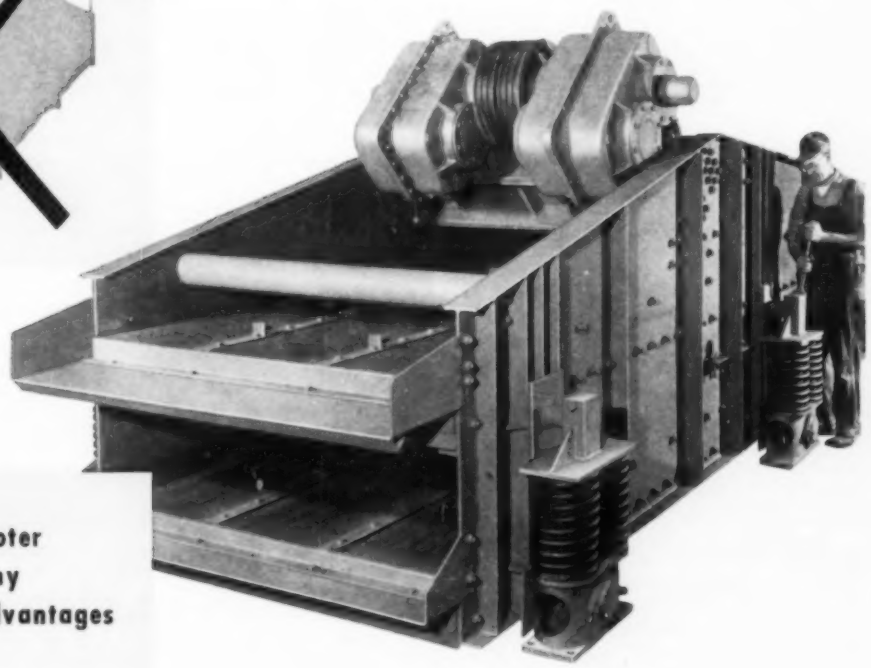

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A-5485

Curbing Acid Mine-Drainage

Ohio State research team discusses ways and means of solving coal's most difficult stream-pollution problem.

INDUSTRY MEETING—
A Special COAL AGE Staff-Written Report

A STRONG PLEA for better coordination of research programming and wider dissemination of data available on control techniques highlighted a conference on the "The Acid Mine-Drainage Problem in Ohio," held at Ohio State University, Columbus, November 26.

The conference—attended by representatives of producing companies, health boards, water-pollution control bodies and research institutions—was called to report results of work conducted by a nine-man OSU research team and sponsored by the Water Pollution Control Board, Dept. of Health, State of Ohio.

Too many of those involved in the acid mine-drainage problem are perhaps looking for a panacea when, in fact, no one control method will apply to all acid-producing situations, Professor E. Q. Moulton stressed. The research team head called for more use of information now available on control techniques and better classification of mines in terms of abatement procedures.

Professor Robert S. Green, executive director of OSU's Engineering Experiment Station, presided over morning and afternoon sessions which included welcoming remarks by Dean G. B. Carson, College of Engineering, and featured the following talks:

The Acid Mine-Drainage Research Program, Prof. R. F. Baker, supervisor, Civil Engineering Research, Engineering Experiment Station.

Acid Formation Studies, Prof. C. I. Randles, Dept. of Bacteriology.

Geologic and Mineralogic Considerations of Acid Mine-Drainage, R. A. Brant, The Ohio Geological Survey, State of Ohio.

The Mine Testing Program, J. R. Lucas, Mining Engineering Div., Dept. of Metallurgical Engineering.

The Impoundment Program, Prof. K. W. Cosens, Dept. of Civil Engineering.

Gob Utilization Studies, Prof. E. E. Smith, supervisor, Chemical Engineering Research, Engineering Experiment Station.

The Future Research Program, Prof. E. Q. Moulton, Dept. of Civil Engineering.

Control Methods

The OSU research team suggested at least five basic methods for correcting or minimizing acid mine-drainage:

1. Eliminate one of the basic causes—air or water—by adding chemicals which destroy acid-producing bacteria or by using sanitary land fills.

2. Devise means to reclaim sulfuric acid for use in various other ways.

3. Dilute the acid by using dams or reservoirs.

4. Add chemicals to streams to neutralize sulfuric acid.

5. Find bacteria which will digest the acid and give off some less harmful substance.

Professor Randles reported that improved methods have been developed for studying oxidation. In the near future, use of these methods should contribute much needed basic data on the mechanism of acid formation. Biological treatment of acid, he added, appears very promising.

Field Research

Field work in the Lake Hope area (southeast Ohio) resulted in the "discovery" of a mineral which is associated with acid formation. The material was first believed to be "cave alum" but it was later tentatively identified as a new mineral similar to cave alum. Analysis of the structure of this oxidation material may improve understanding of acid formation.

In other phases of field research conducted in southeast Ohio, studies of geologic formations in the Vinton and Sandy Run county areas were made. These studies underscored the importance of analyzing the structure of a coal bed and rock formations in developing any mine sealing program.

Since damming up streams to form reservoirs was considered one possibility for curbing acid mine-drainage, a test site was selected at an old washed-out earth dam in the Puritan Run drainage basin, near Wellston, Ohio. Hydrologic data and information on acid production gathered at the site of the proposed dam will prove valuable to future research, it was stated.

The McDaniels Mine, a small drift mine in Coal Hollow, near state Rte. 278, was also selected as the test mine for evaluating the effect of mine seals and to provide a site for future research. The mine has been sealed and data collected at the seal may provide information for possible research at other larger installations.

Future Program

Specific recommendations for further research included:

1. Further study of biological and chemical aspects of sulfuric acid formation in mines.

2. Studies of the use of bacteria to counteract acid-forming conditions.

3. Further use of the test mine installation at McDaniels Mine to gather more information.

4. Publication of data on known remedies now used by strip mines and others. Included in these publications would be a classification of the kinds of acid-producing situations and descriptions of the methods now understood to correct those situations.

A summary of OSU's acid mine-drainage research, "The Acid Mine-Drainage Problem in Ohio," has been published by the Engineering Experiment Station in Bulletin No. 166. The bulletin includes a bibliography of 600 published references on acid mine-drainage.

Coming in *Coal Age* . . .

In the next issue, the editors and contributing authors will present the annual review of events in the coal industry, including a report of economic developments, a roundup of deep mining, preparation and stripping innovations, a survey of safety in 1957, and a Bureau of Mines listing of equipment sales last year. This annual review offers salient statistics on the various aspects of the industry—for the trend chroniclers—and a fast-moving account of developments in production techniques and equipment—for you, the trend makers.

In addition, the February issue of *Coal Age* will carry a full fare of articles designed to satisfy your need for ideas that can help you in your situation. Among these will be a full explanation of the latest use of rope-belt conveyors with continuous miners, a description of breaking coal seams after stripping using a deep ripper, and a feature on the applications and maintenance of portable cables in stripping.

Top management, in operations and sales, cannot afford to miss an analysis entitled, "Coal for Electric Power: 1958-75," also coming in February.

Coal Abroad

KOREA

PREPARATION PLANT looks like modern ranch home.

MEMBER of 13-man UNKRA team demonstrates drilling.

TAIWAN

NEW POWER PLANT stocks mound of coal from Chien Chi.

COAL for power plant is loaded while girls work at screening.

Industrial Progress in Far Eastern Mining Villages

THROUGH THE AID of the United Nations Korean Reconstruction Agency (UNKRA), industrial progress and social advancement are going hand-in-hand in a small coal-mining valley of eastern Korea. It is difficult to comprehend that this village is so remote, that the only reliable communication is by radio, and so inaccessible that until a railway came to the area, two years ago, one had to reach the populated shadow between the mountains of Kangwon province, by sea.

Once a depressed area of barren rocks and sparse paddy fields, the valley has become a thriving industrial community, having an effect on surrounding communities so as to raise living standards and increase communication. The story of how they are doing it is told by lines of hill-side hoists carrying coal to the narrow-gage railway linking groups of mines; a long string of mining cars being pulled by electric locomotives to the coal preparation plant; a network of cables bringing power from the outside; and other signs of increasing industrialization. The miners are eager and hard working for they know that the 400 chalet-like cottages spread over a wooded area, replacing barren shacks which once served as homes, are tangible rewards in their battle to outrace the past.

In order to save UNKRA funds for machinery and equipment, maximum use of locally procurable materials goes into constructing the mines. Bridges have been built from scrap iron of junked locomotives and many homemade wooden minecars

ECONOMIC INDEPENDENCE is the goal of those who seek buried treasure in the hills of northern Taiwan. The treasure is coal, and through the help of Coal Exploration, Inc. (CEI), a Chinese government concern which is aided by grants from the United States, large-scale mining is getting into swing. For a long time, the theory existed that coal might be buried in suboceanic seams. On a hill sloping to the Pacific Ocean, workers employed by CEI dug 670 ft through sand and shale until they struck a seam, estimated at two-million tons of recoverable coal. Today the project is the privately-owned Chien Chi coal mine, which is producing 2,000 tons a month and is trucking 43% of this to the new power plant two miles away.

CEI sponsors many such projects as the Chien Chi venture. Should an initial investigation indicate coal, the next step is to ascertain the depth of the seam by drilling or tunneling. The tunnel method is preferred because the excavation automatically becomes the mouth of the mine if coal is discovered. When this happens, the mine owner must use a part of his first receipts to repay CEI for its investment. To date it appears that about 20% of the money will be refunded.

More than $20,000,000 in local currency has been programmed for CEI from counterpart funds, which accrue from the sale of American aid commodities. The Mutual Security Mission to China also has granted $20,000 for the purchase of

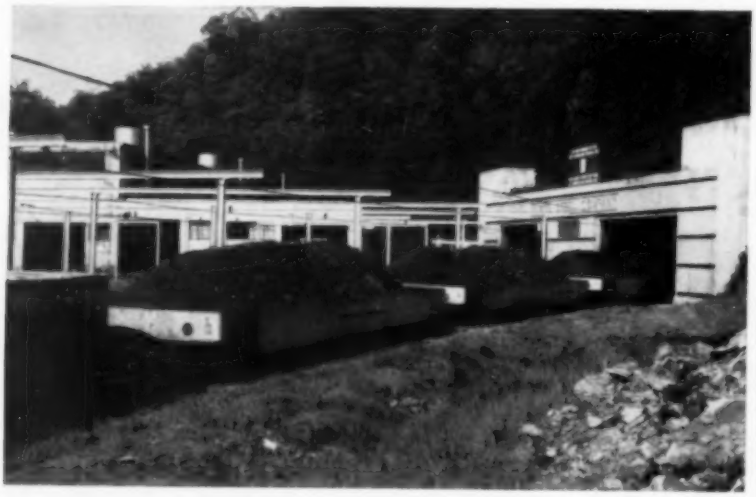
Korea (*Continued*)

are in use. Main pit props are made of Korean timber, but experiments are being made with procured telescopic steel props. Along this line, UNKRA is aiding the transition process from old to new by providing electric trolley locomotives, one-ton minecars, electric rotary coal drills and other new machines. The health of the community is watched over by two doctors, and a modern clinic and dispensary have been built to insure a bright future for the village, which, in all likelihood, will continue to grow and prosper.

Taiwan (*Continued*)

equipment, and has sent three Chinese specialists to the United States for training in coal geology.

There was a time when Taiwan had a surplus of coal and could export it to other Far Eastern countries. But each new factory—and there have been many in recent years—has claimed its share of the surplus, so that this year's anticipated output of 2.7 million tons barely will meet domestic needs. Coal mining in the Taiwan hills keeps China from having to face a staggering foreign exchange bill for imported fuel.



haulage capacity . . .

Place: Wheelwright, Kentucky
Wheelwright Mine and
Price No. 1 Mine
Operator: Inland Steel Company
Mine Car Dimensions: 24'6" (body length)
Height: 24" above rail
Width: 8'0"
Weight: 8600 lbs. (empty)
Capacity: 262 cubic feet (level load)
392 cubic feet (crown load)

where can you match it?

Since 1915—
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DIFFERENTIAL
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GREAT BRITAIN

Much Uncertainty

The status of coal in England is as changeable as the weather. In a letter to the London Times, John Raven, director of British Coal Exporters' Federation, has accused the government of inconsistent policy, bad forecasts and badly balanced development. He added that successive ministers have supported coal exports in principle and their elimination in practice. He was referring to government decrees cutting exports in order to reduce imports of American "large" coal.

Replying to criticism, Sir James Bowman, chairman of the National Coal Board, has insisted that it could climb out of the red if given freedom to act as a commercial concern. He has termed the NCB as an organization that lives in "a kind of half world." There has been feeling that British industry, in effect, was damaging the national interest by wasting fuel, and the treasury has declared that industry could save at least seven to 10 million tons of coal annually with "relatively small capital expenditure" on improved operating procedures.

The most recent development has been the announcement that two power stations now under construction will be coal-burning instead of oil-burning, and that conversion of a third station from oil to coal is being considered. This would reduce consumption of oil by between 1½ million to 2 million tons a year. The Times has bitterly attacked the government as having failed to coordinate the development of the fuel and power industries. Two years ago the switch to oil from coal in power stations was being pressed as immediately vital for maintaining power supplies, the newspaper points out. Whether the unsettled conditions will improve is to be seen.

EGYPT

New Discovery

Coal deposits have been discovered in the Sinai Peninsula in Egypt for the first time, says Industry Minister, Aziz Sidky. He has said deposits totalling an estimated million tons were found in the peninsula of eastern Egypt.

INDIA

Coke Plant

The government of India is said to be considering a proposal to establish near Kothagudem Collieries in Andhra Pradesh, a low-temperature carbonization plant for the production of domestic coke at a cheap price. The capacity of the plant, if built, will be about 1,600 tons per day. Besides obtaining the

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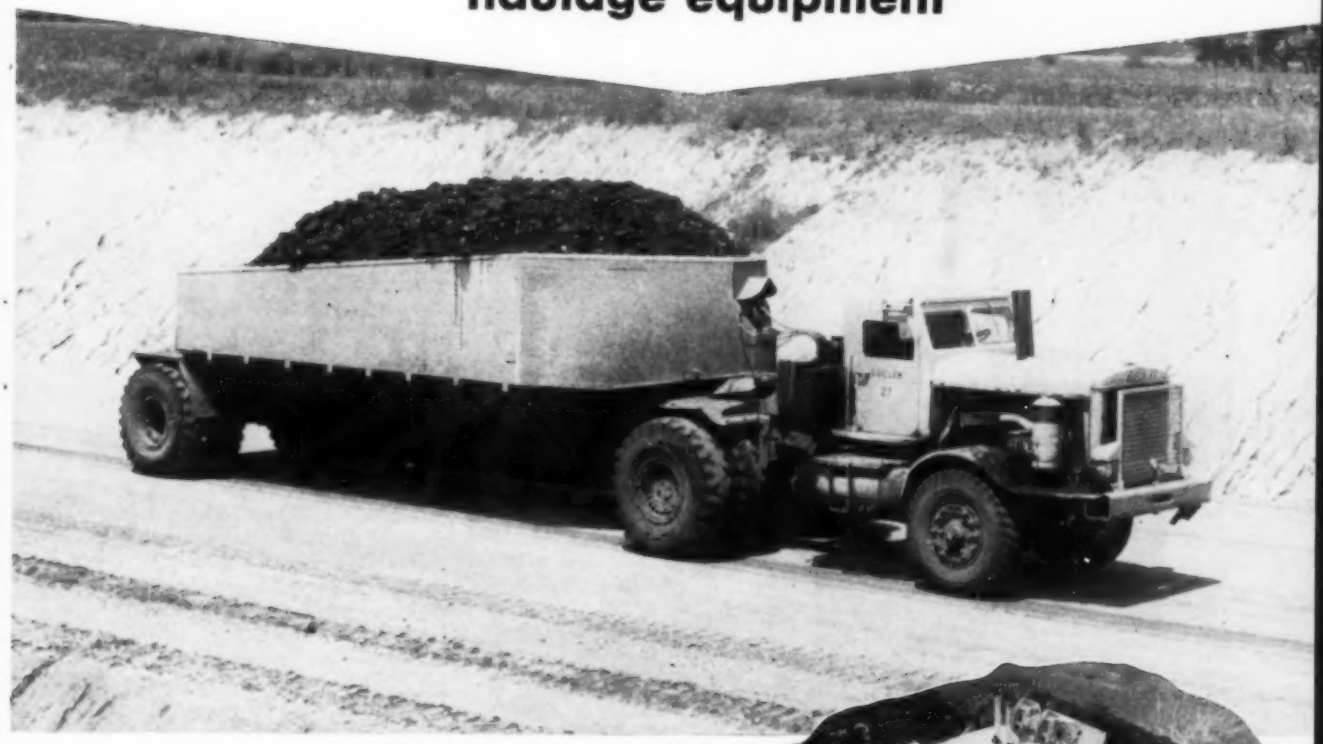

With the rise in costs putting the pinch on coal mining profits, it's more important than ever to have equipment that will produce more and protect your profit margin. Have you checked the cost-cutting advantages of Euclid equipment recently?

The TC-12 Twin-Power Crawler, for example, with a total of 436 hp, has the size, weight, power and traction to handle the toughest stripping jobs. Two 218 hp engines and separate Torqmatic Drives for each track give this "Euc" unmatched work-ability and maneuverability. Eight rollers and 7074 sq. in. of track area assure good stability with heavy duty dozer and ripper attachments. Top speed is 7.8 mph forward or reverse.

Euclid Coal Haulers are available in 25, 40 and 51 ton capacities, powered by 210 to 360 hp engines, with Torqmatic Drive, 5-speed and 10-speed transmissions. They are designed and built as complete units with proper weight distribution for maximum traction and ease of handling.

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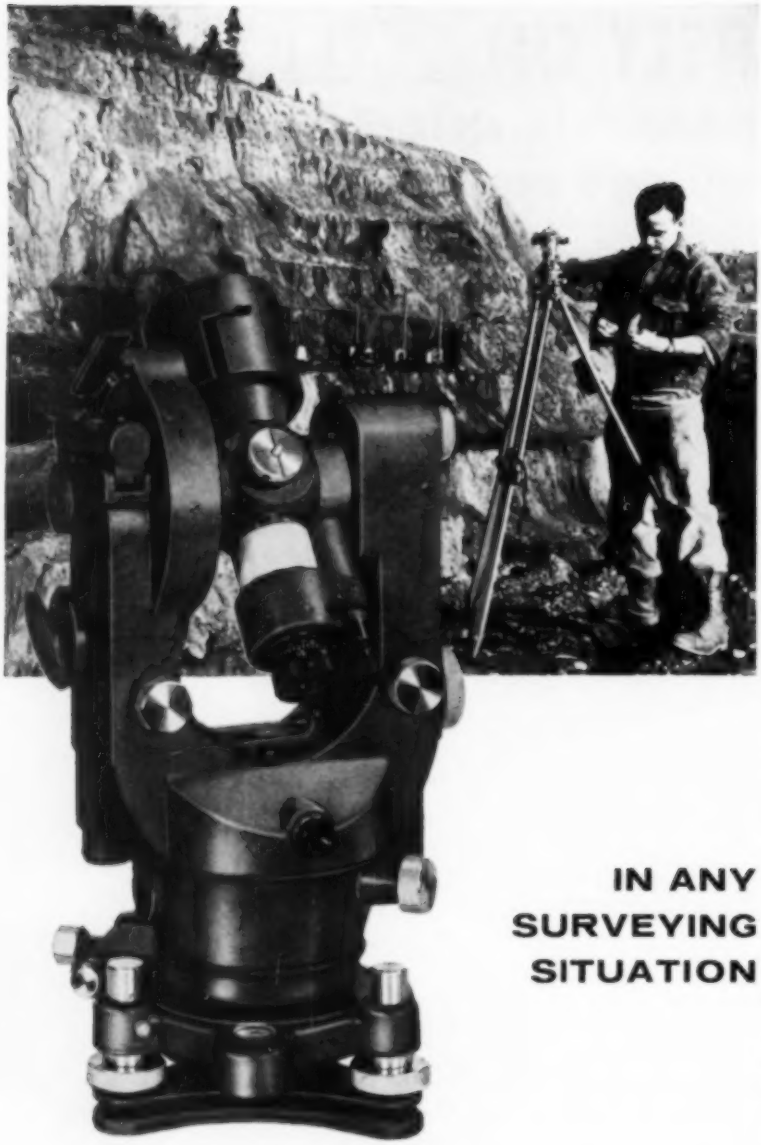

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India (*Continued*)

smokeless domestic fuel, other products like low-temperature tar, tar acids, pitch and ammoniacal liquor can also be gotten. The scheme for the factory has been drawn up based on the pilot survey conducted at the Regional Research Laboratory. They say that coals available in the area are of the non-caking type with medium volatile matter and relatively high ash content. The carbonization of the coals in the laboratory has yielded fruitful results and the product is already being sold under the trade name of "Koalsite."

USSR

More Coal

It is reported that Russia plans to increase her coal production by 40 to 60%, only in the coming 10 to 15 yr. As 1957 production was approximately 452 million tons, the plans aim at an expansion to 650 tons per yr at least. Soviets have operated since 1935, declares a German newspaper, five major plants that produce gas by underground gasification of coal. The paper reports that a group of British engineers, presently visiting the USSR for the purpose of studying these underground gasification plants, will aid in starting a British plant in 1958.

GERMANY

Research Project

The atomic research center of the German state, North Rhine-Westphalia will be established in the Stetternich forest near Juelich, it was decided by the Westphalian government. Previous plans to locate the research center near Dueren were abandoned because of vast brown coal deposits in that region. The establishment of two reactors and 12 institutes would have made it impossible to mine those 480 million tons of coal. Preparatory construction work on the research center has already begun.

ITALY

Coal Figures

Italian coal requirements for the first quarter of 1958 are expected to total 3,250,000 tons, of which approximately 75% will be purchased in the United States, according to an official announcement. The balance will come from the countries of the European Coal and Steel Community. The requirement figure for the first quarter of 1958 is slightly higher than that for the same period of 1957. The Italian coal supply reached a peak in September.

No. 1 in a series

Right off the Wire

An all-electronic telephone exchange (said to be the first for commercial use) has no moving parts, is noiseless and can be used in explosive atmospheres. It includes a "memory" which will hold an incoming call.

Wire can be strung beside a railroad track by a new travelling crane at the rate of 60,000 feet per hour.

Simplex recently completed one of the largest and heaviest shipments of cable ever transported on one reel — nearly two miles of ANHYDREX XX insulated submarine cable weighing 60 tons.

A new rubber-like material is porous, but will contain liquids.

Boron, lithium, hydrogen peroxide and fluorine compounds are to be the fuels of a new bomber reported to be in the design stage.

Smog-causing chemicals from automobile exhausts can be eliminated by a chemical catalyst developed by an automobile manufacturer.

Improvements in the explosive rivet have made it noiseless.

Only the touch of a hand is needed to light a new lamp. The electricity in the hand does the work.

Thorium is about three times as plentiful as uranium. A new process for the production of reactor-grade thorium should lead to a reduction in the cost of atomic fuel.

A high-output ultraviolet lamp, for heating and air-conditioning ducts, is claimed to be 1,000 times more effective in killing viruses and bacteria than an equal amount of radiation from the sun.

The world's largest solar furnace is to be completed in 1959. It will produce temperatures as high as 8,000°F, which is about 70% of the temperature of the sun's surface.

An ultra-hard glass has been developed that retains its hardness up to 1508°F.

The cost of converting sea water to fresh water has been reduced from $1.50 to 60 cents per thousand gallons.

"Talk-back TV", a new advance in educational television, enables a pupil to ask questions of a teacher who is broadcasting from a distant room.

Scientists have been able to produce shock waves with speeds of more than 100,000 mph (above Mach 150) involving temperatures higher than 100,000°F.

Some 1958 automobiles are using aluminum instead of copper in battery cables.

The first deep sea telephone cables to utilize the revolutionary new Bell Laboratory vacuum tube repeaters were manufactured by Simplex. Minimum tube life is expected to be 20 years.

Danish trawlers are using nylon propellers. The four-foot, three-bladed size weighs only seventeen pounds and they reduce vibration, resist impact damage and corrosion.

A cell that generates electricity by the chemical action of oxygen and hydrogen has been announced. It avoids some of the disadvantages of both dry cells and storage batteries.

An airplane has been built which can change its shape while in flight for the purpose of testing aerodynamic configurations.

C-L-X (Sealex) is the name of a new, completely sealed, corrugated metallic cable sheath manufactured by Simplex. It is pliable, moistureproof, and permits cable engineers to select the most economical cable cores, while assuring the greatest mechanical protection available.

Observations of the aurora during the Geophysical Year show that it occurs simultaneously at both the North and South Poles. This definitely identifies it with the earth's magnetic field.

A miniature battery about the size of a paper clip is said to deliver a steady flow of current for 176,000 hours.

Shirtsleeve Service

Simplex recently completed an order for 4600 ft. of Anhydrex XX Parkway Cable. The Simplex man was on the spot to help with installation, which happened to be on a 9,500 ft. mountain in rough terrain. He helped design a reel mounting bracket (for holding up to 7200 lbs.) for the front of the tractor used for laying. He supervised the laying of two lengths 2200 feet long.

This case typifies the kind of cooperation that Simplex offers in order to assure correct installation and satisfactory service.

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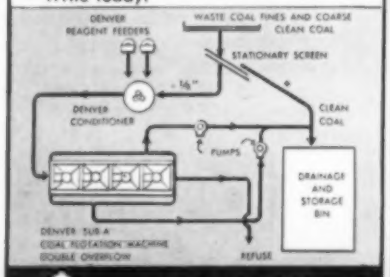

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New Books

Europe's Coal Industry

The Coal Industry in Europe is the third report by the coal committee of the Organization for European Economic Co-operation. This report is in three parts: (1) the coal industry in 1956; (2) short and long term prospects of the coal markets; and (3) manpower and exports. Each section is divided into subtopics which are covered in detail. *92 pp. including 15 tables and an appendix on brown coal. 6x9¼-in; paper. $1.25, Organization for European Economic Co-operation, Suite 1223, 1346 Connecticut Ave., N. W., Washington 6, D. C.*

Human Relations

Making Management Human, by Alfred J. Marrow. This work is designed to serve as a guide to the use of psychology in observing and appraising people in industry, their nature and their motives. And in solving problems of their morale and productivity. The author draws on his 20 yr of experience, including the results of practical psychological applications and studies in his own company, for the facts in this book. The book is filled with ideas and suggestions for getting things done through people. *248 pp. 6x9-in; cloth. $5, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.*

Metal-Grating Standards

Metal Grating Handbook is the first all-inclusive technical publication providing a product standardization in the metal grating industry. *32pp. 8½x11-in; paper. $1, Metal Grating Institute, Inc., One Gateway Center, Pittsburgh 22, Pa.*

Fuel Technology

Low-Temperature Carbonization Assays of North American Coals, by W. A. Selvig and W. H. Ode. This report presents the results of Fischer-Schrader bench-scale, low-temperature carbonization assays at 500 C made by the Chemistry and Physics Section at the Pittsburgh station of the Bureau of Mines. Since 1930 about 400 samples of coal were assayed and results were published in more than 50 separate publications. This paper summarizes the data in the published reports as well as all unpublished data obtained to Jan. 1, 1956. *56 pp. 8x10½-in; paper; mimeo. Bulletin 571. 35¢, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Development of the Fischer-Tropsch Oil-Recycle Process, by H. E. Benson, J. H. Field, D. Bienstock, R. R. Nagel, L. W. Brunn, C. O. Hawk, J. H. Crowell and H. H. Storch. This bulletin describes the development of the oil-recycle process on a small, pilot-plant scale for conducting the Fischer-Tropsch synthesis of hydrocarbons from carbon monoxide and hydrogen mixtures. Experimental results cover the 8-yr period from 1943 to 1951. *72 pp. 8x10½-in; paper; mimeo. Bulletin 568. 45¢, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Coal Analysis

Comparison of Methods for Determination of Volatile Matter and Ash in Coal, by O. W. Rees, F. A. Coolican and E. D. Pierron. This report offers two American and two European methods for determination of volatile matter, and determinations for ash at two different final temperatures as well as certain different rates of heating. *8 pp. 6¾x10-in; paper. Circular 240, Illinois State Geological Survey, Urbana, Ill.*

The following publications may be obtained free upon request to the Publications-Distribution Section, Bureau of

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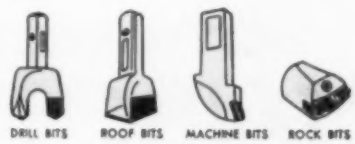

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Recommended Safety Standards for Shaft Sinking, I. C. 7810

Making Ventilation-Pressure Surveys with Altimeters, I. C. 7809

Thickness of Bituminous-Coal and Lignite Seams at All Mines and Thickness of Overburden at Strip Mines in the United States in 1955, I. C. 7812

Use of Lignin Sulfonate for Dust Control on Haulage Roads in Arid Regions, I. C. 7806

Field-Scale Experiments in Underground Gasification of Coal at Gorgas, Alabama; Use of Electrolinking-Carbonization as a Means of Site Preparation, R. I. 5367.

W. L. DEGAN is chief clerk at Peabody Coal's River King mine. (See River King article, p 76.)

Bituminous Output

YEAR TO DATE	PRODUCTION
December 14, 1957	469,315,000
December 15, 1956	482,721,000

1957 output 2.8% behind 1956.

A month earlier output was 1.5% behind 1956.

WEEK ENDING	PRODUCTION
December 14, 1957	8,910,000
December 15, 1956	10,835,000

Anthracite Output

YEAR TO DATE	PRODUCTION
December 14, 1957	24,575,000
December 15, 1956	27,915,000

1957 output 12.0% behind 1956.

A month earlier 1957 output was 11.4% behind 1956.

WEEK ENDING	PRODUCTION
December 14, 1957	484,000
December 15, 1956	691,000

After drilling 15 to 20 shoot-holes, the Tractair moves to the next job. "We save time and labor because the Le Roi unit doesn't need to be babied into position," says Green. "We drive the Tractair onto rocks, slopes, or loose ground and start drilling."

Tractairs* Save $150 a Day at Blasting Site

Le Roi tractor-compressor used to drill shoot-holes for blasting overburden

Easier and safer to handle on rough terrain than dozer-drawn compressors, superintendent says

The V. N. Green Co., Brown's Branch, W. Va., saves $50 per day at each site by using Le Roi Tractairs to drill shoot-holes for blasting surface rock at their strip mining operations. When all three Tractairs are used, as is generally the case, daily savings total $150, reports John W. Green, job superintendent.

Previously-used wheel type compressors had to be moved around the site by a standby dozer. The 10 to 15 moves per day took two hours. The dozer lost the same amount of time, too, when its work was interrupted.

Mobility Minimizes Delays

Green points out that now "the Tractair is driven directly to the drilling area, the hose is attached, and drilling starts at once." In addition, Tractair's easy maneuverability over the extremely rough terrain cuts previous relocation time by more than half, and eliminates the need for the dozer as well as the operator.

Because it's self-propelled, the Le Roi tractor-compressor is ideal for this type of work. When a job is done, the Tractair provides fast transportation for the operator, drill, and compressor to the next site. There's no need to wait for other equipment to make the move.

What's more, close-to-the-job air power shortens hose lines, substantially reduces hose damage, and eliminates power loss. The shorter lines and Tractair's 125 cfm output permit the use of two drills, when necessary.

Performs Various Jobs

Bought originally for drilling shoot-holes, the Tractair can be used for other jobs, too. "We also use our Tractairs to break paving on road construction jobs where we do the resurfacing, to tamp backfill for drain pipes, and even to clean pavement by using a rotary brush attachment."

The self-propelled, multi-purpose Tractair can provide similar savings for you. And its ready adaptability to a wide range of attachments can help you reduce the cost of operations requiring costly, one-purpose equipment. Contact Le Roi today.

*"Tractair" is the registered trademark for Le Roi's combination tractor—air compressor.

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T-77

Current Coal Patents

By: Oliver S. North

Preparation and use of drilling fluid treating agents, E. I. Crowley and N. W. Franke (assigned to Gulf Research & Development Co., Pittsburgh, Pa.), Nov. 19, 1957. Manufacture of drilling fluid-treating agents from lignite. Ground, dried lignite is reacted with aqueous sodium hydroxide and oxygen gas under pressure at a temperature of 125 to 325 C., and acidified to precipitate free acids, which are separated. Solution is extracted with an ether and the resulting raffinate extracted with a solvent. All products are useful as mud conditioning agents. No. 2,813,826.

Drilling fluids incorporating derivatives of lignitic materials, E. I. Crowley and N. W. Franke (assigned to Gulf Research & Development Co., Pittsburgh, Pa.), Nov. 19, 1957. This patent relates mainly to use of the drilling mud additives manufactured from lignite by the process described in U. S. Patent No. 2,813,826 (see above). No. 2,813,827.

Sample taking conveyor, R. W. Moyle Jr. Nov. 26, 1957. An apparatus for taking regular, representative samples from fluent solid materials, such as powdered or pulverized coal or the like. A hollow helical screw has spaced inlet and outlet openings for drawing and removing samples. No. 2,814,204.

Conveyor take-up, B. F. Tracy (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 3, 1957. Efficient, compact and simplified form of take-up for a conveyor of the endless chain and flight type in which the chain and flights travel along two aligned trough sections one of which is relatively movable with respect to the other. Take-up is attained by adjustably moving the support for the relatively movable trough section, as required. No. 2,815,114.

Clamp for coal loading pan, G. A. Mesanko (25% each assigned to F. J. Motley and J. H. Prothero, both of Punxsutawney, Pa.), Dec. 10, 1957. Improvements in clamps for securing the loading or conveyor pan onto the loading bars of coal loading machinery. The clamp jaws have lugs or teeth on opposing faces to effectively clamp the flange at the side edge of the loading pan between the jaws. The device is simple in construction and relatively inexpensive. No. 2,815,840.

Boring type miner having adjustable upper and lower guides for cusp cutting means, E. J. Hlinsky (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 3, 1957. Improved mechanism for raising and lowering boring-type mining machine cutter bars which remove cusps. No. 2,815,196.

Process of treating coal, W. J. Kruppa and J. B. Rinckhoff (assigned to American Cyanamid Co., New York, N. Y.), Dec. 3, 1957. Improved method of pretreating swelling and caking coals to desirably modify their coking characteristics. No. 2,815,316.

Drop-bottom mine car, R. A. Shields (assigned to American Car & Foundry Co., New York, N. Y.), Dec. 10, 1957. A drop bottom mine car, such as is used for carrying coal from a face, is provided with a door latch operating mechanism carried by the car in a position where it cannot be readily damaged by coal loading machinery. This mechanism can be quickly applied to existing cars with a minimum of modification and expense, No. 2,815,721.

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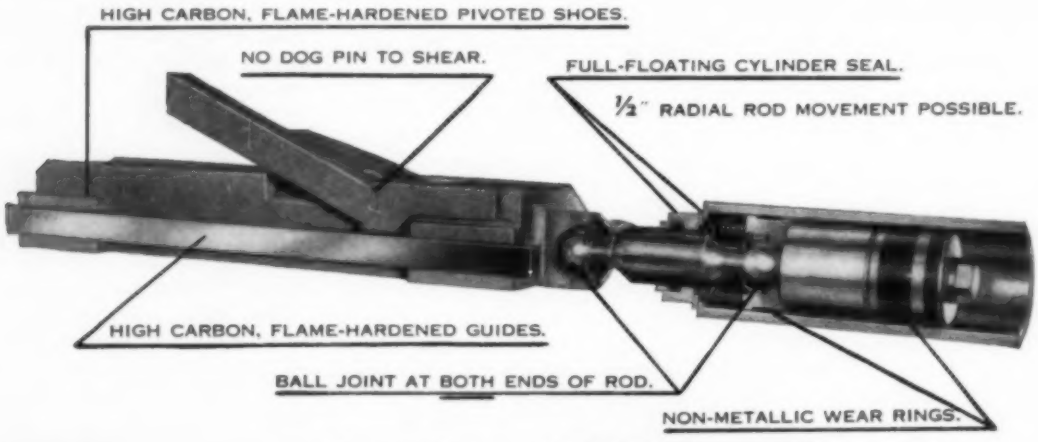
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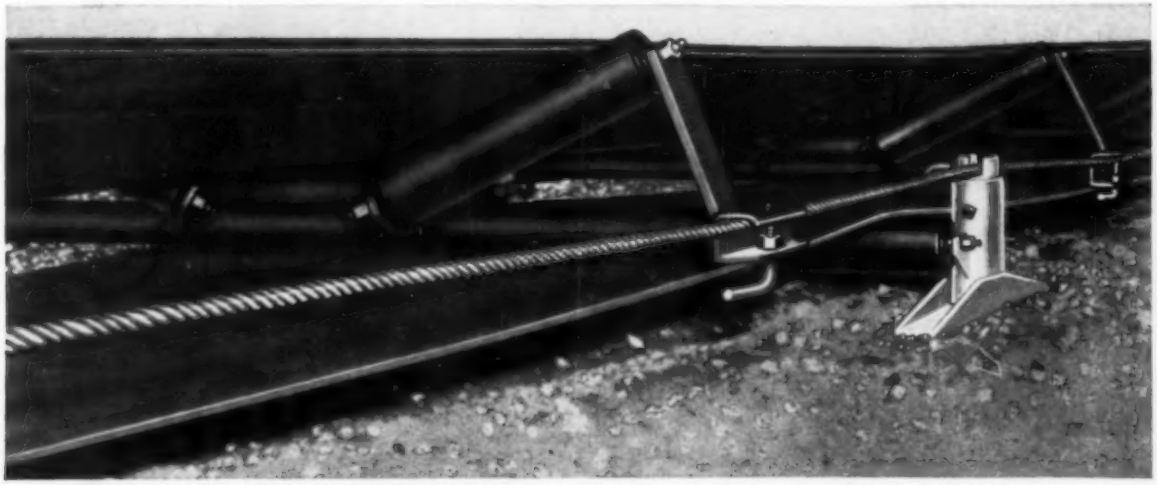

- **Automatic Self-Training** is provided since idlers rock in direction of belt travel.
- **Greater Safety** results as there are no side obstructions at level of carrying belt. Handling men and supplies is safe and easy.
- **Adjustable Height** rope supports minimize blocking—permit belt leveling in undulating bottom. Height adjustments for all seam thicknesses.
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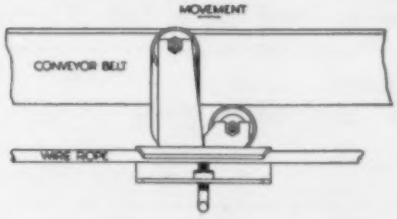
- **Deep Trough design** reduces spillage and permits wider spacing between idlers.
- **Simpler, easier installation.** New type anchors have built-in tensioning device with quick acting rope clamps that permit use of continuous rope.
- **Overlapping rolls** eliminate possibility of belt edge contact with inside end of troughing rolls.

Lo-Rope Idler Assembly (Patent Applied For)



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The Lo-Rope troughing rolls and carrying belt are entirely above the rope side frame—any tipping movement of the troughing rolls is in the direction of belt travel. This gives a well-established, self-training effect *automatically* in *both* directions of travel.

This feature—the rocking movement on the rope as opposed to swinging—is an entirely new principle that offers important advantages not previously available.

For full information on LONG Lo-Rope Belt Conveyors or a demonstration, write us today

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Here are some figures that will interest you:

KOEHRING MODEL	SIZE DIPPER	LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load.)	
205 CRAWLER	½-Yd.	20,000 lbs.	at 10-ft. radius
205 ON RUBBER	½-Yd.	30,000 lbs. 14,600 lbs.	at 12-ft. radius at 20-ft. radius
305 CRAWLER	¾-Yd.	30,000 lbs.	at 12-ft. radius
305 ON RUBBER	¾-Yd.	30,000 lbs. 15,800 lbs.	at 10-ft. radius at 30-ft. radius
405 CRAWLER	1-Yd.	40,000 lbs.	at 12-ft. radius
445 ON RUBBER	(Crane only)	90,000 lbs. 40,000 lbs.	at 15 ft. radius at 25-ft. radius
605 CRAWLER	1½-Yds.	72,300 lbs.	at 12-ft. radius
805 CRAWLER	2-Yds.	104,200 lbs.	at 12-ft. radius
1205 CRAWLER	3-Yds.	190,000 lbs.	at 12-ft. radius

Want more information? *See Koehring distributor.*

Solid footing on soft banks — Loading gravel off the bottom of a water-filled pit, Koehring 405 dragline (above) holds firmly to the edge of soft, loose banks. Stability of its extra-long, extra-wide crawlers shows up to good advantage in conditions like this. Extra stability means extra work-capacity, too. The heavy-duty 405 handles 1 to 1½ cubic-yard dragline or clamshell buckets on a wide work-radius — boom lengths range from 40 to 90 feet. Butt-connected boom is solid, safe. Inserts are easily changed. Check the 405's other work capacities (in chart) — then have Koehring distributor demonstrate what it will do on your lifting, loading, stripping, stockpiling.

Quarry rock — ¾-yard 305 loads out Lannon stone in a Mid-West quarry. It's a rugged rock shovel, with exceptional operating ease. Big 23-inch main-drum power clutch requires only 1/10th the lever-pull of a comparable-size manual clutch — yet, retains "feel" of load.

15-ton handyman — With its heavy lift capacity and high-speed mobility, Koehring 205 truck crane is a handy material-handling rig to have around. It unloads heavy equipment and supplies, installs machinery — converts to ½ to ¾-yd. clamshell or dragline, ½-yd. shovel, hoe.

Big stripper — Look at the work range of this big 1205 high-lift shovel. It digs up to a height of 42 ft.-10 in. at 45° boom angle — dumps at a height of 31 ft.-5 in. That's with a 3-yard dipper on 40-foot boom. *Need more reach?* It also takes a 2½-yard dipper on a 50-foot boom — has 51 ft.-4 in. cutting height, and 40 ft.-10 in. dumping height, at 45° angle! For heaviest digging, the standard 1205 has 3-yard dipper on 30-foot boom. On dragline or clamshell work, it handles 3 to 4-yard buckets on 60 to 170 feet of boom. *Want more facts?* See Koehring distributor for complete story on this big 1205. Call today.

KOEHRING DIVISION OF KOEHRING COMPANY, Milwaukee 16, Wis. K761

Tax Appeal

Glen Alden Corp., appealing to an examining board of Luzerne County, Pa., has asked for a substantial tax reduction on their property, claiming that a bleak market situation has put them in poor financial straits. It was announced that the total assessment on Glen Alden's land in Luzerne County has been fixed at $35,450,000 for 1958, which is a $1,941,000 reduction from the previous year. However, officials of the coal company claim that the land values in question are considerably lower, and indications are that a push may be on for approximately a 50% reduction of the 1958 assessment.

Francis O. Case, Glen Alden president, interviewed at the hearing, has revealed that the company is taking further steps in its plans to divest itself of a portion of its coal properties. In some quarters it is thought that Glen Alden may seek transfer of some properties to the county on a temporary basis, during which time, the properties would be non-productive and untaxed. Later, when conditions warrant, the properties could be reclaimed by Glen Alden, and placed on a productive basis and in a taxed status. The hearings will continue until some solution to Glen Alden's problems is provided. Glen Alden also owns Mathes Air Conditioning Operations and La France, a fire equipment concern.

NEW SPEED AND DRILLING ECONOMY
WITH THE NEW IMPROVED

Parmanco

MODEL CD-51-57

COAL AND CLAY DRILL

- Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
- Cutting Shield And Guide Completely Automatic
- Drill Powered By 65 H.P. Water Cooled Motor.

Jack Foehrer, *Pit Foreman says*

"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."

SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO. PARIS, ILLINOIS

Mines, Companies

A formal announcement that equipment will be removed from the Misco mine near Deavertown, Ohio, has dashed hopes of miners that it might be reopened.

Simpson Coal & Coke Corp. of New York, N.Y., says that the unfavorable market situation has forced termination of operations, and that salvage value of the machinery will be only a fraction of its original cost, which was more than $4,000,000.

Glen Castle mine of the Hanna Coal Co., Pittsburgh Consolidation subsidiary has become the largest underground coal mine in Ohio, according to reports.

The Ohio Dept. of Industrial Relations says that Glen Castle has supplanted Powhatan Mining Co.'s No. 3 mine at Dilles, which also lost out to its sister, No. 1. Placed in operation only in 1955, Glen Castle's production has soared to 1,624,784 tons.

Reopening of two small mining operations in the Hazleton, Pa., area will provide employment for upwards of 65 men, sources say.

Fifteen or more men are expected to be employed at the Yorktown colliery, near Audenreid, when it reopens before the end of the year, and about 50 Hazleton area mine workers could be employed at the Stockton Slope mine of Gravine Coal Co.

W. G. Duncan Coal Co., Greenville, Ky., has given word of approval for the liquidation of the company and the disposition of its properties.

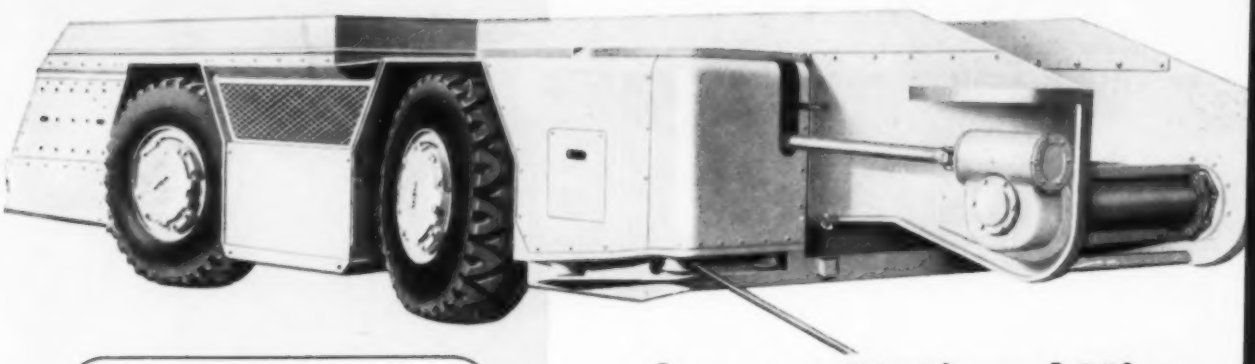
Reports say that the firm's Graham mine has ceased operations. The plant, with its machinery and other equipment, is being offered for sale.

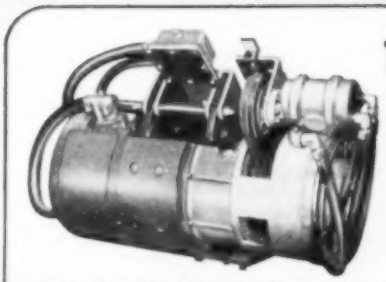
The Y&O Coal Co. has acquired considerable coal acreage in Goshen Township in Belmont County, and the firm may be eying development along the B. & O. R.R. betwen Bellair & Barnsville, W. Va.

The transaction is said to be the largest of its kind since the Powhatan Mining Co. bought the Rail & River Co. No. 3 mine at Dilles some time ago. There is no immediate indication as to the value of the coal tract.

Pittsburgh Consolidation Coal Co. has

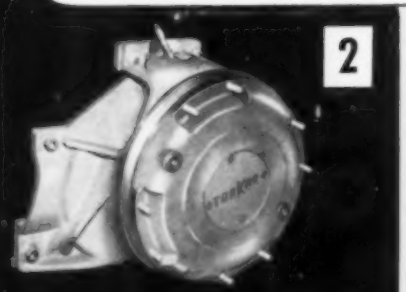
Engineered for Rugged Service and Economy





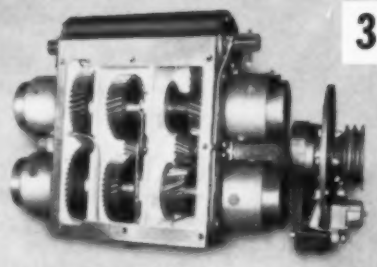
1

SINGLE MOTOR AND TORQUE CONVERTER



2

INTERCHANGEABLE WHEEL UNITS



3

CONSTANT-MESH TRANSMISSION

the new National Mine TORKAR* A.C. or D.C. Shuttle Car

1 A single, large, non-reversing A.C. or D.C. motor amply provides all the power requirements of the new National Mine Torkar and effects substantial savings in motor maintenance. Electrical controls and wiring are at a minimum, further reducing maintenance costs. The motor drives through a torque converter which allows the motor to operate in its most efficient range, prolonging motor life, eliminating the possibility of thermal damage to the motor and conserving current.

2 New type wheel units of heavy automotive design are a feature of the Torkar, and all four are identical and interchangeable. They employ a spiral tooth spur gear-and-pinion drive running in oil. The units are not adversely affected by housing misalignments, and are extremely rugged and durable.

3 Three speeds forward and reverse are provided by the constant-mesh transmission, which permits selection of the gear ratio best suited for the roadbed or grade, eliminates "jogging," and provides dynamic braking. The transmission makes possible the use of a highly efficient non-reversing motor, protects the motor against overloading, reduces wear on the service brake and further reduces power consumption.

For complete details on how the Torkar can reduce your shuttle car costs, consult your National Mine representative or write.

National Mine Service Company

National Mine Service Company

564 Alcoa Building • Pittsburgh 19, Pennsylvania

All-State Division, Logan, W. Va. — Anthracite Division, Forty Fort, Pa. — Ashland Division, Ashland, Ky. — Bemeco Division, Beckley, W. Va. — Clarkson Division, Nashville, Ill.

Kentucky-Virginia Division, Jenkins, Ky. — Western Kentucky Division, Madisonville, Ky. — Whiteman Division, Indiana, Pa. — Mountaineer Division, Morgantown, W. Va.

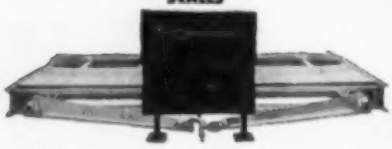
*Trademark

U.S. Bureau of Mines

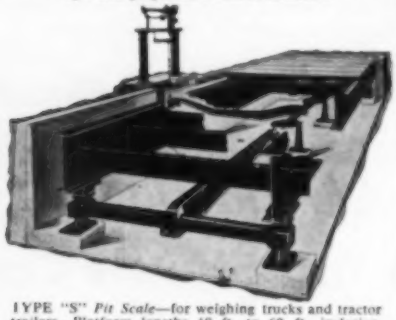
WINSLOW

Dependable — Accurate

TRUCK and TRACTOR TRAILER SCALES



TYPE "C. S." *Portable Scale*—easily and quickly set up—with preparation held to minimum



TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

WINSLOW SCALE COMPANY

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Phone for more details, North 6515

Scale Manufacturers since 1896

CONFERRING in office at Peabody's River King mine are John Fuller (left), draftsman; R. J. Harmon, pit superintendent; Harry Nesch, assistant to superintendent; and Thomas Rhodes, preparation manager, Illinois Division. (See article p 76.)

Mines, Companies (*Continued*)

announced the purchase of sizeable land tracts along the Ohio River as possible sites for industrial plants.

The firm's Hanna Coal Div. is said to have paid $732,000 for about 1,580 acres of farm land in the area near Marietta, Ohio. The Pennsylvania R.R. also bought about 662 acres of land in the same area.

Accidents

Four men have died in an explosion at a Peerless Coal Co. mine in the Excelsior field between Hackett and Greenwood, Ark., on state highway 10.

At least six men are said to have been in the mine at the time of the blast. The cause of the blast is said to have been gas accumulation and ignition.

Five miners have been killed in a rock cave-in which occurred just a few minutes before their work shift was to end.

Tons of rock caved in on the men at the Raleigh-Wyoming Mining Co. mine, 15 mi southeast of Beckley, W. Va. Company officials blame the accident on a "mountain bump" which caused pressure from above to centralize on the mine roof.

Three Utah coal miners died in a cave-in deep inside the Kaiser Steel Co.'s No. 1 mine, at Sunnyside, Utah.

Mine officials have not yet explained the cave-in, according to reports.

Utilization

The Golden Valley Electric Assn., Inc., of Fairbanks, Alaska, has retained consultants to study the feasibility of constructing a $6 million coal-fired steam-generating plant at nearby Nenana.

Reports say that the association expects to require an additional 15,000 kw of capacity by 1962 to meet anticipated requirements. The announcement that 20,000,000 acres of government land in northern Alaska will be released next year for gas and oil exploration, is expected to result in sharply increased activity in the Fairbanks area.

Black Hills Power & Light Co., Rapid

acf Load-support MINE CAR WHEELS

Quick-chilling after casting gives acf Chilled Tread Car Wheels extra resistance to abrasion and wear, gives you real economy through long service life. Gray iron center costs less to mount, reduces vibration and effects of stress concentration. Curved plates support tread at load center: minimize damage to treads.

Cross Section of acf "Load Support" Mine Car Wheel showing: (1) uniform depth of hardening, (2) extra heavy overhang, (3) support at center of tread.

For further information, just ask your acf representative.

AMERICAN CAR AND FOUNDRY

DIVISION OF ACF INDUSTRIES, INCORPORATED

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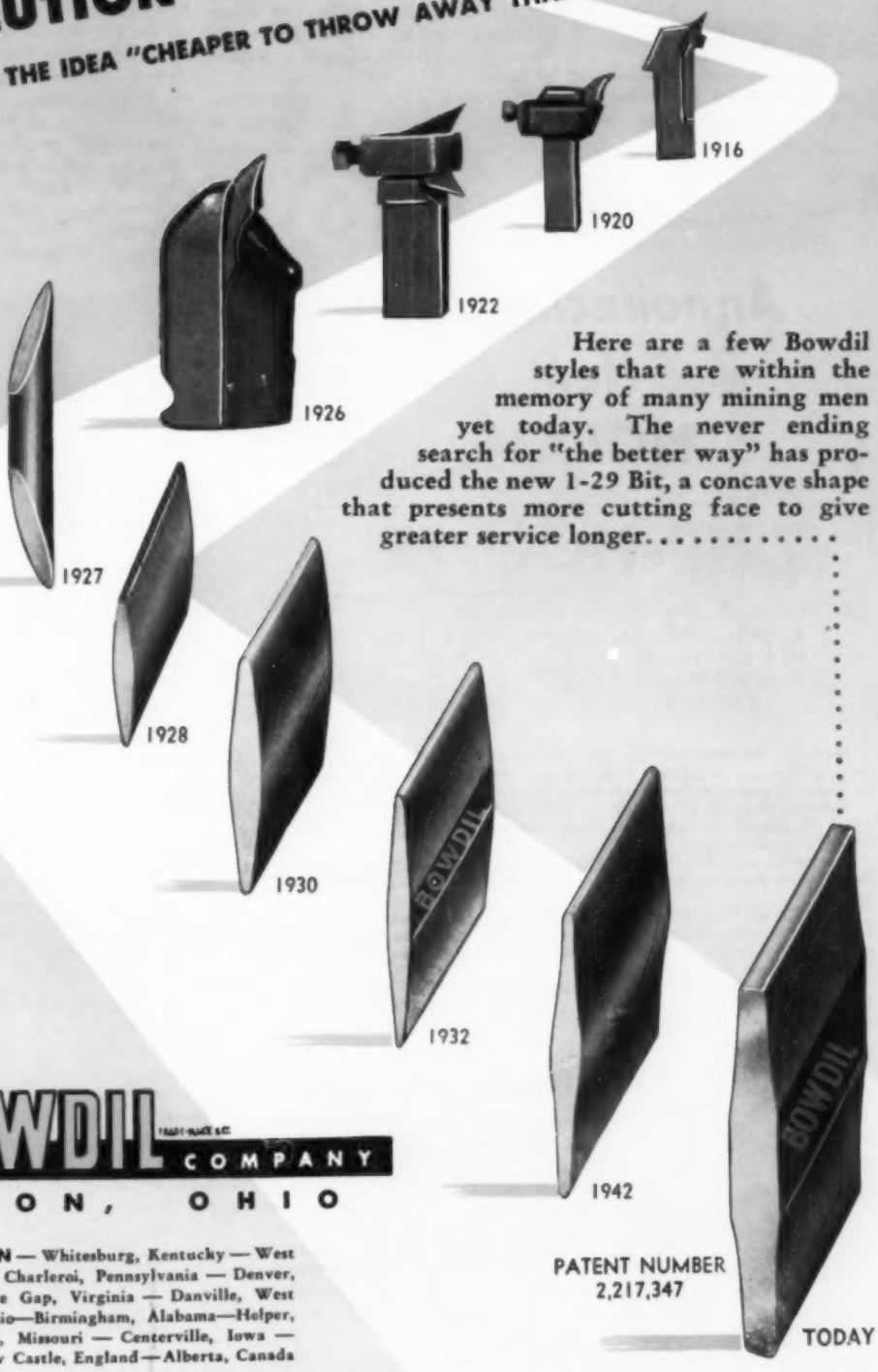
EVOLUTION OF THE BOWDIL BIT . . .

BASED ON THE IDEA "CHEAPER TO THROW AWAY THAN TO RE-SHARPEN"



Here are a few Bowdil styles that are within the memory of many mining men yet today. The never ending search for "the better way" has produced the new 1-29 Bit, a concave shape that presents more cutting face to give greater service longer. . . . . .

PATENT NUMBER
2,217,347

The BOWDIL COMPANY

CANTON, OHIO

SALES ENGINEERS IN — Whitesburg, Kentucky — West Frankfort, Illinois — Charleroi, Pennsylvania — Denver, Colorado — Big Stone Gap, Virginia — Danville, West Virginia—Canton, Ohio—Birmingham, Alabama—Helper, Utah — Kansas City, Missouri — Centerville, Iowa — Topeka, Kansas—New Castle, England—Alberta, Canada

Utilization (*Continued*)

City, S.D., has joined the Wyoming Natural Resource Board, University of Wyoming and several other private companies in a cooperative coal-tar research program.

The research is being made in an effort to develop new industries for Wyoming's vast coal deposits.

Transportation

A tugboat embodying application of the most advanced principles in scientific marine design, according to its makers, is under construction at Neville Island shipyards of Dravo Corp., Pittsburgh.

Dravo engineers believe the 1600-hp vessel, being built for Pittsburgh Consolidation Coal Co., will be the most efficient towboat of its draft ever to operate on inland waterways.

Free inspection of railroad or industrial yard trackage is being offered by Morrison Metalweld Process, a division of Morrison Ry. Supply Corp.

The company says that a word to any Metalweld office in Buffalo, Chicago or Pittsburgh, will bring a field engineer to make an on-the-spot inspection of the track facilities, with suggestions as to reconditioning for lower cost and greater efficiency.

Coal officials, anxious to see southern Illinois developed as a large coal-producing area, are fighting for good water transportation from that central region.

Proposals for deepening the channels of the Big Muddy and the Saline rivers, to make possible heavy shipment of coal from Illinois are being pressed upon Paul H. Douglas, Illinois senator. If congressional approval of the project could be secured, and the ideas carried out, coal might be sent up and down the Mississippi River, and to Chicago, where it can get to the Atlantic Ocean via the Great Lakes Waterway, when that route to the sea is opened.

Announcing the New NOLAN

TRIP-HOLDER

An Efficient Development for Use with the NOLAN Porta-Feeder . . . Will Positively Hold or Retard Car Trips on Down Grades . . . Eliminates use of Skids or Brakes.

Precision, bullseye spotting and holding of mine trip cars on any down grade now is possible with the new NOLAN Trip-Holder and its famous companion unit, the NOLAN Porta-Feeder!

The new NOLAN Trip-Holder is an efficient heavy-duty assembly which is placed between the tracks either above or below the NOLAN Porta-Feeder.

The entire assembly is actuated by scientifically-designed units that assure positive, automatic spotting and holding cars on any grade.

The NOLAN Trip-Holder is installed in the same manner as the NOLAN Porta-Feeder, being anchored on the mine tracks and requiring no excavation. The Trip-Holder has an overall length only a few feet longer than the mine car.

Write us now for details on the new profit-pair that is assuring greater mine efficiency and output . . . the NOLAN Porta-Feeder and the NOLAN Trip-Holder.

NOLAN

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106 Pennsylvania Street • Bowerston, Ohio

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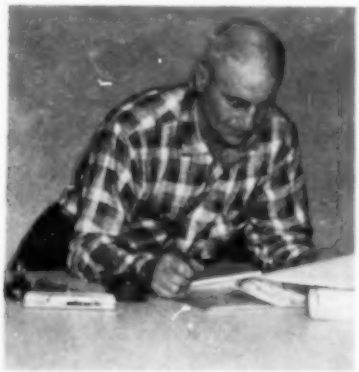


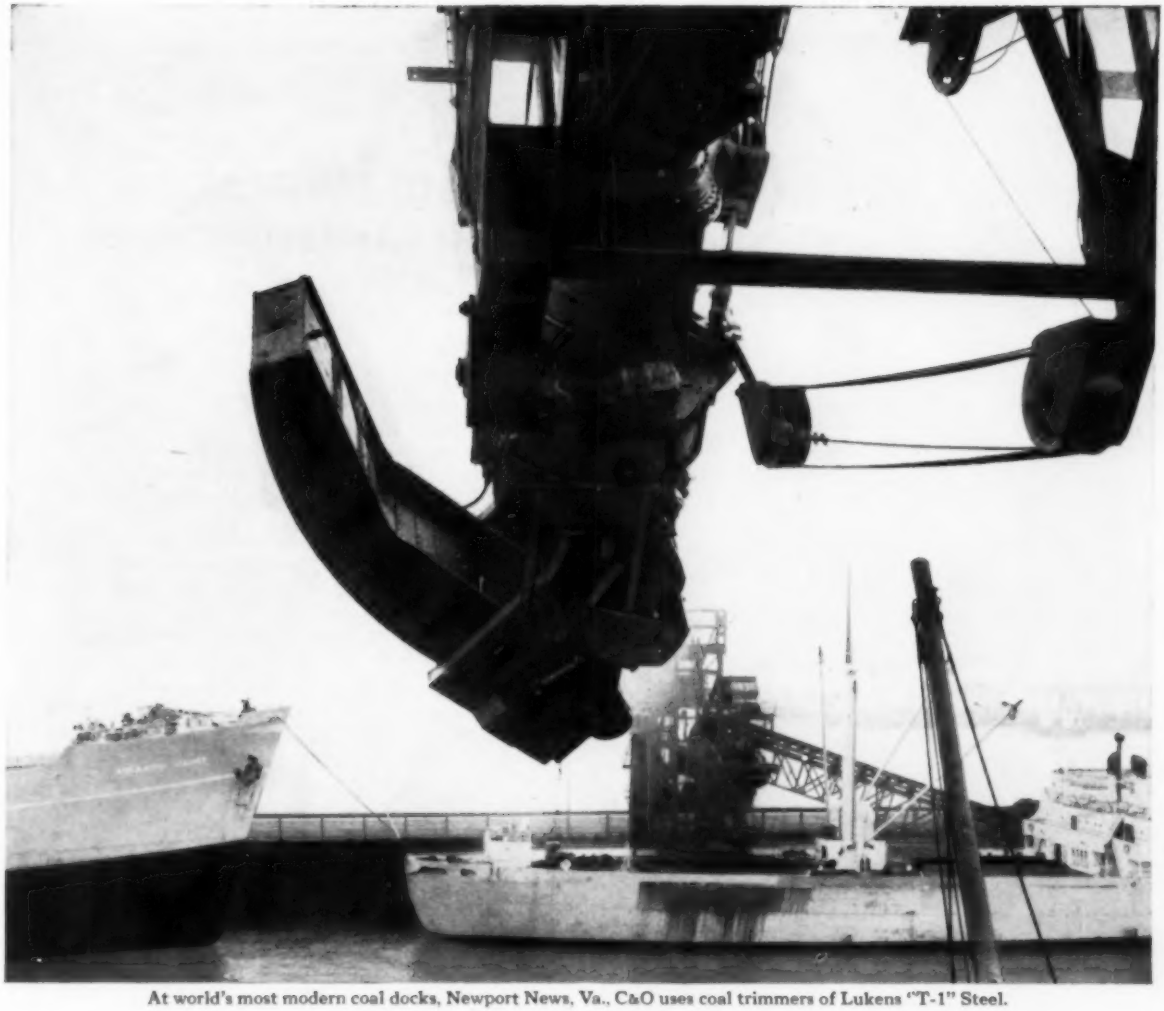
L. H. CUNNINGHAM is resident engineer at Peabody River King mine. (See article about River King on p 76.)

Prep. Facilities (*Continued*)

gineering Co. for two heavy-media systems, one 7-ft Hydrotator, one 12-ft hydrotator classifier, and other supplementary equipment including a shaker, crushers, elevators and conveyors, for preparing various sizes of anthracite coal.

Jeddo-Highland Coal Co., Midvalley, Pa.—Contract closed with Wilmot Engineering Co. for a complete fine coal preparation plant and equipment including one 6-ft Hydrotator, one 12-ft Hydrotator classifier and one 12-ft froth unit, and other supplementary equipment including riffles, bucket elevators and flight conveyors, for preparing various sizes of anthracite coal.

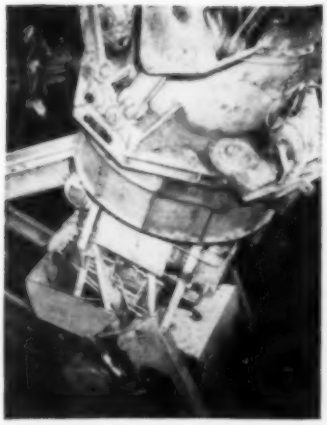
Colitz Coal Co., Pottsville, Pa.—Contract closed with Wilmot Engineering Co. for heavy media system to replace existing facilities for preparation. O. C. C. heavy media vessel will have feed capacity of 125 tph.



At world's most modern coal docks, Newport News, Va., C&O uses coal trimmers of Lukens "T-1" Steel.

New Coal Loading Machine is tougher and lighter— made with Lukens "T-1" Steel

TRADEMARK



Tough, weight-saving Lukens "T-1" gives this trimmer added mobility.

When the C&O Railway designed this huge new coal trimmer, they chose Lukens "T-1" steel for its combination of high strength and toughness—plus ready workability. Construction required less steel, produced outstanding abrasion resistance.

Now with stepped up efficiency, this mammoth machine easily and economically deposits 2,000 tons of coal an hour deep in the holds of ships—with a minimum of wear and maintenance.

Whether you handle coal, stone, gravel or metal ores, Lukens "T-1" steel used in areas hardest hit by punishing abrasive impact will save you money, too. It has tripled the life of rock driers. The 321 minimum Brinell quality has been known to outlast previous metals by 18 to 1 in quarry wear plates. Chutes, hoppers, and mine cars are other typical applications.

And Lukens "T-1" steel retains its remarkable toughness at temperatures well below zero. Send for our informative illustrated booklet, "Lukens 'T-1' Steel." Write Manager, Marketing Service, Room 962, Lukens Steel Company, Coatesville, Pennsylvania.

LUKENS

Helping industry choose steels that fit the job

JOY RBD-15

ROTARY ROOF BOLTING DRILL

FOR SHALE, SLATE, OR SANDSTONE ROOF

The Joy RBD-15 is a hydraulic rotary drill designed to bottom holes in 65% of all U. S. coal mines in often half the time required by pneumatic or electric drills. A central hydraulic system coupled directly to a 15 hp electric motor powers tramming, steering, drill rotation, drill feed and boom roll.

The RBD-15 operates in seams from 42″ to 96″ high. One basic frame and chassis is offered in two heights; the 33″ model for low and medium-low seams, and the 37″ model for high seams, or for medium seams requiring high ground clearance.

Simple controls, centralized at the operator's station, provide instant control of thrust, feed-speed and torque and drilling angle. Drills, runs steel and sets bolt without gear shifting.

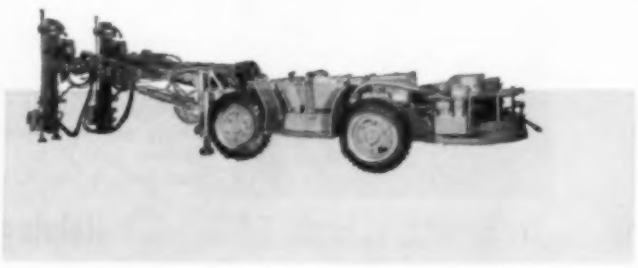
HIGHLY MANEUVERABLE

The RBD-15 is fast and flexible . . . trams up to 108 fpm. Individually controlled pairs of wheels on each side can be powered independently . . . forward on one side—reverse on the other . . . the machine turns in its own length (dimensions 33″ x 42″ x 9′ 6″) like a crawler mounted unit.

TWIN BOOM MODEL

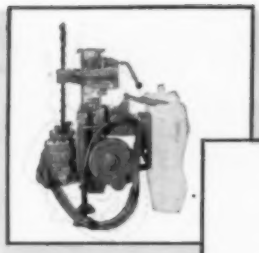
The RBD-11 has twin booms with RDU-1 drill units. Each boom swings 90° out and 25° in to provide a 23 foot face drilling range . . . has 240° roll and 30° tilt . . . can be individually controlled. The RBD-11 is an all-hydraulic machine, 43″ high, 82″ wide and 22′ long, equipped with a 26 hp electric motor, and a four section hydraulic pump. The RBD-8 is a single boom version of the RBD-11, available with either electric or diesel power.

The RBD-7 is an unmounted boom and drill unit to be mounted on a mine car or shuttle car.



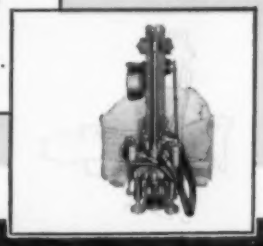
DRILLS AT ANY ANGLE GETS IN ANYWHERE

(TURNS IN ITS OWN LENGTH)



Boom Tilt

Boom Roll

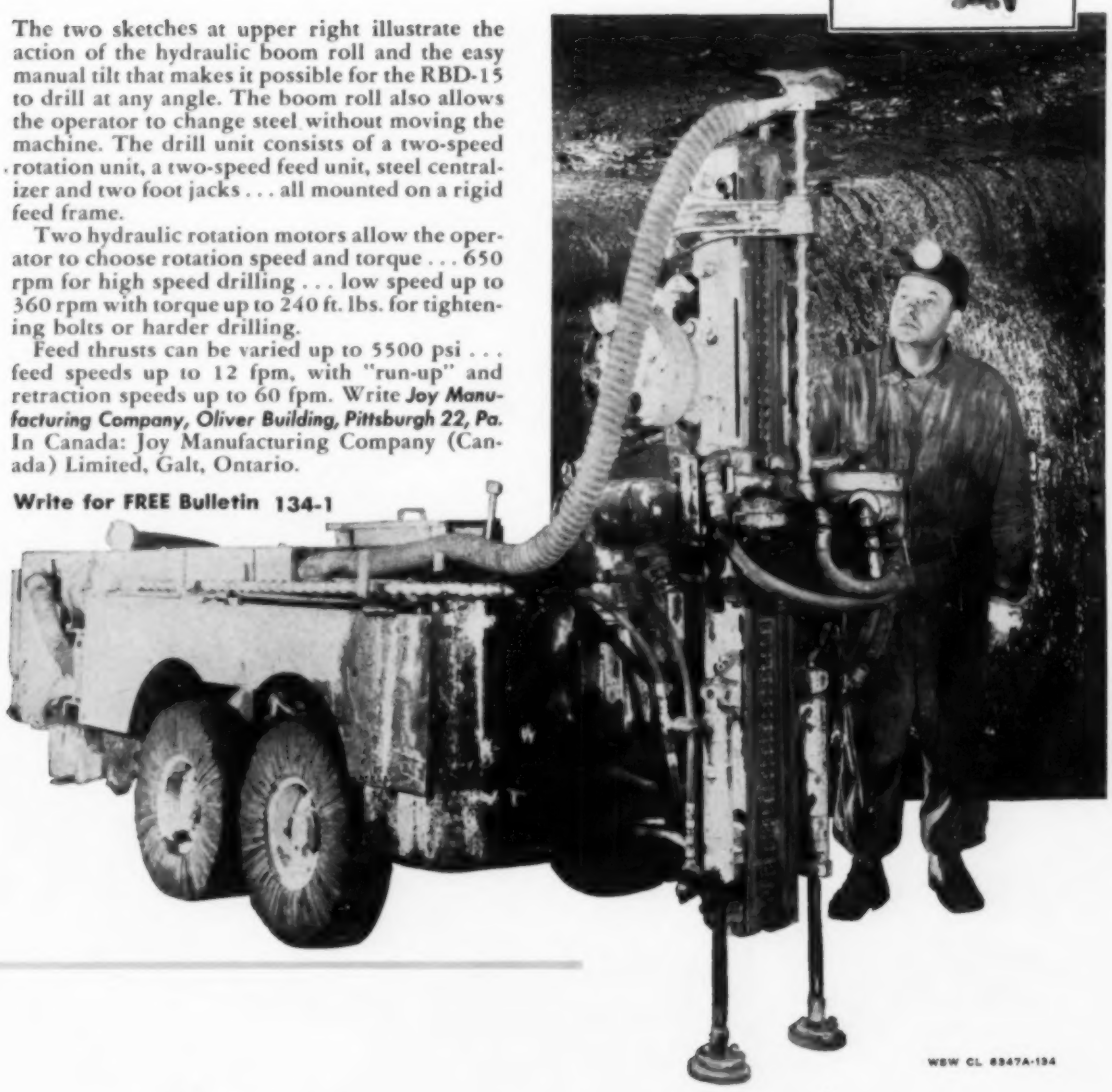


The two sketches at upper right illustrate the action of the hydraulic boom roll and the easy manual tilt that makes it possible for the RBD-15 to drill at any angle. The boom roll also allows the operator to change steel without moving the machine. The drill unit consists of a two-speed rotation unit, a two-speed feed unit, steel centralizer and two foot jacks . . . all mounted on a rigid feed frame.

Two hydraulic rotation motors allow the operator to choose rotation speed and torque . . . 650 rpm for high speed drilling . . . low speed up to 360 rpm with torque up to 240 ft. lbs. for tightening bolts or harder drilling.

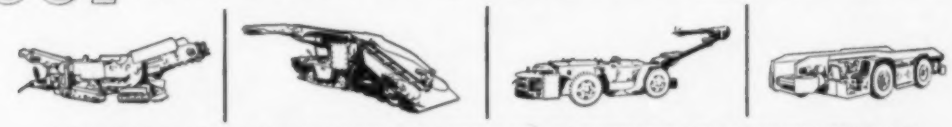
Feed thrusts can be varied up to 5500 psi . . . feed speeds up to 12 fpm, with "run-up" and retraction speeds up to 60 fpm. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

Write for FREE Bulletin 134-1



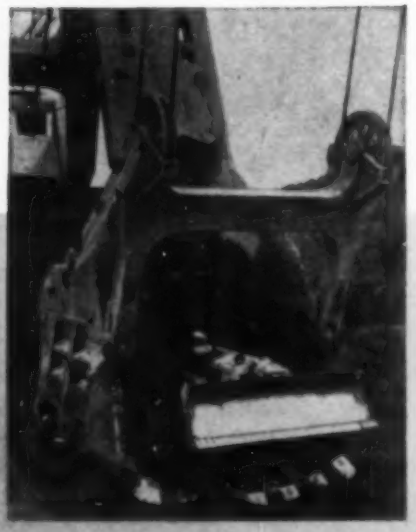
WSW CL 6347A-134

JOY EQUIPMENT FOR MINING...FOR ALL INDUSTRY



CONTINUOUS MINERS, MOBILE LOADERS, SHUTTLE CARS, COAL CUTTERS, CUTTING MACHINE TRUCKS, COAL DRILLS, CONVEYORS, TIMBER SETTERS, SHUTTLE CAR ELEVATORS, BELT FEEDERS, FANS, BITS, PORTABLE BLOWERS, COMPRESSORS ROCK DRILLS, HOISTS, CORE DRILLS

Queen of the big shovels



55-CU.-YD. DIPPER makes a bulldozer look small. The Tiger Brand Wire Rope is 2⅝" in diameter.

THE RIVER QUEEN, largest shovel ever built by Bucyrus Erie. Now operating in the River Queen mine near Central City, Kentucky. The mine is owned jointly by W. G. Duncan Coal Co. and Peabody Coal Co. It is operated by Peabody.

can move 100,000 tons daily

with "muscles" of Tiger Brand Wire Rope

IN LESS THAN A MINUTE, the River Queen can scoop up an 80-ton bite of rock and earth, pile it 295 feet away and be ready for the next bite. That's fast digging!

The River Queen is the largest power shovel that Bucyrus Erie has ever built. It has a 55-cubic-yard dipper and is as high as a 13-story building.

The wire ropes that harness the tremendous power of the shovel are all U.S.S. American Tiger Brand. The two twin-reeved hoist ropes are 2⅝"-diameter, 6 x 49 Lang Lay Monitor Excellay with Independent Wire Rope Core. The two twin-reeved crowd ropes and the single twin-reeved backhaul rope are of the same size and construction.

The boom supports are eight in number for a total length of approximately 952 feet. These are 2½" Galvanized Boom Support Strands of special design for long service life.

The fact that all the wire rope applications on this huge shovel are handled by standard Tiger Brand constructions emphasizes the quality of the engineering that goes into the complete line of Tiger Brand Wire Rope.

THE BIG BOOM is 145 feet long and is supported by eight 2½" Tiger Brand Boom Supports. Note also the two twin-reeved hoist ropes in foreground.

AMERICAN STEEL & WIRE DIVISION
United States Steel, General Offices: Cleveland, Ohio

The right wire rope will do the trick!

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

USS AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

the design of the blade makes

ALLIS-CHALMERS engineering in action

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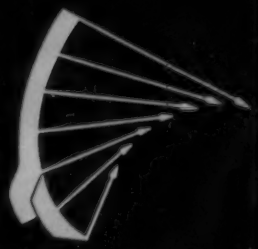
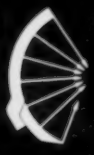
THE ROLL-AWAY MOLDBOARD MOVES BIG LOADS FASTER



Each portion of blade forces material toward a *different* point. Packing is eliminated. Pressure and friction against blade decreases toward top of blade — no wasted power.

ORDINARY MOLDBOARD



Each portion of blade forces material toward a *fixed* point. Packing action causes high friction over entire blade — wastes power.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

the difference

ROLL-AWAY is an Allis-Chalmers trademark.

ROLL-AWAY

Knot shown is the clove hitch, made in Plain or Reinforced Primacord and drawn tightly around the Plastic Reinforced Primacord.

Plastic Reinforced Primacord Branch Line, recommended for extremely deep holes — also river crossings and other wet conditions. Covered with a tough plastic material — waterproof and resistant to acids commonly encountered. Tensile strength 275 lbs. 1000-ft. spool weighs 22 lbs.

Don't Worry... use Primacord

Why worry about stray electrical currents when you can hook-up and detonate with Primacord? It acts as the detonating agent throughout the entire column of explosives, or furnishes initiation to primers of blasting agents. This means safer, easier, quicker loading. It connects all holes. This means that you can plan your shots to obtain better fragmentation.

When your blast is loaded and hooked up, it cannot be set off by normal vibration or friction, ordinary impact or sparks, *or stray electrical currents.* Even a direct hit by lightning failed to detonate it. Primacord must be detonated with fuse and cap or electric blasting cap.

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Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®, Quarrycord®, Pyrotechnical Devices and Blasting Accessories

Hook-up and detonate with

PRIMACORD®

and guard against *Stray Current* hazards

Reinforced Primacord Trunk Line — also recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 160 lbs. 1000-ft. spool weighs 19 lbs.

P-b

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

COAL AGE

JANUARY, 1958

IVAN A. GIVEN, EDITOR

Sooner and Higher

ON BALANCE, it can be argued that the year 1957 was a fairly good one for bituminous coal as an industry, at the same time recognizing that this is not necessarily true for all individual companies and producing areas. As always, benefits and adversities are not equally distributed, and 1957 was no exception. Anthracite, which as yet must depend primarily on the heating market and thus cannot get help from a diversity of outlets, did not fare quite as well as bituminous because of weather and the continued pressure of oil and gas. But considering that both industries had to cope with a real business recession, it can, to repeat, be contended that things were fairly good.

Upturn When?

Since the bituminous industry's rate of activity in particular is directly related to the level of general business the big question now is: When the upturn? Not so long ago many experts were talking of next fall or winter. Lately, however, a few optimists have turned up, and there is evidence that business and industry could perk up much sooner, especially if military spending should provide a little boost. As a result of all this, the betting in some quarters is that the upturn could come as early as the first quarter and certainly by the end of the first half.

Problem of Today

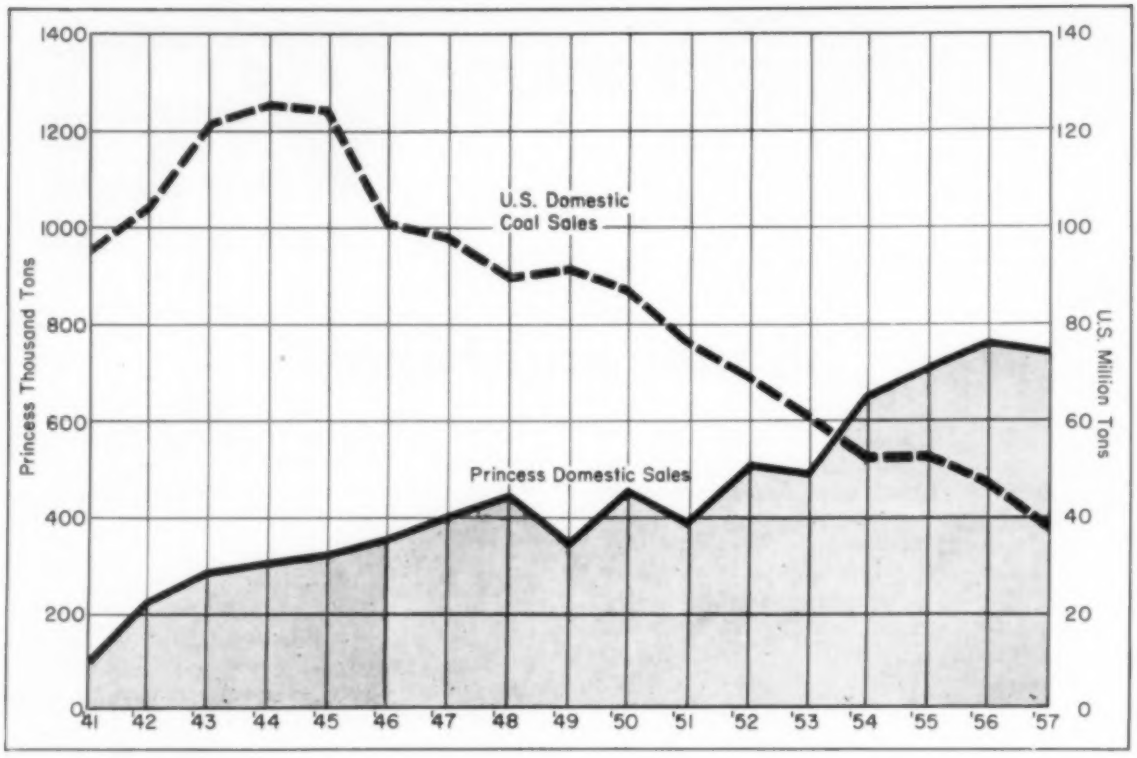
Business recessions always confront coal with a kingsized problem. As the operating rate drops, and as customers take advantage of the situation to turn on the heat, the pressure on prices begins to mount. The greater the excess of capacity over the production rate the greater the pressure. The oldtimers in coal—and there are many still active—can remember when increasing pressure over a period of time resulted in complete collapse and price chaos, with consequent damage that required years to repair. But at this moment, even though production has dropped somewhat while capacity to produce has increased, such a price collapse is only a possibility and not a probabilty.

Basic Decision

Today's situation, however, does highlight again a perennial coal problem—price maintenance. This is true even though changes in thinking and in basic approach have brought about an improvement. This new attitude, however, is yet to be tested by a long-continued recession. In addition, the gains in realization still are not sufficient to assure coal, as an industry, enough money for necessary improvements in plant and equipment, for the maintenance of a good income for management and men, and for a fair return to the shareholders. This latter alone is the best reason in the world for a firm stand against price concessions that are not warranted by improvements in costs.

Pivotal Year

Actually, 1958, like 1954, could be a pivotal year. In 1954 coal hit a similar low but came back to gain new ground. The keys were recognition of the importance of production progress in building sound business, and of the importance of price stability as a means of assuring coal the income it needs to advance through better service. To repeat, 1958 could be another pivotal year. A sober look at today's problems and tomorrow's prospects makes vividly clear once again that long-range planning must be carried on, that profits and progress go hand in hand, and that shortsighted selling and a reduction in service to the consumer can only result in weakening coal's position in relation to competition. Basically, the present situation is a pause in an upward climb. Holding to policies that advance the interests of the industry will insure that that climb will be resumed sooner and will go higher.



Growth in sales (above) . . . . . and in market territory (right) shows how . . . . . .

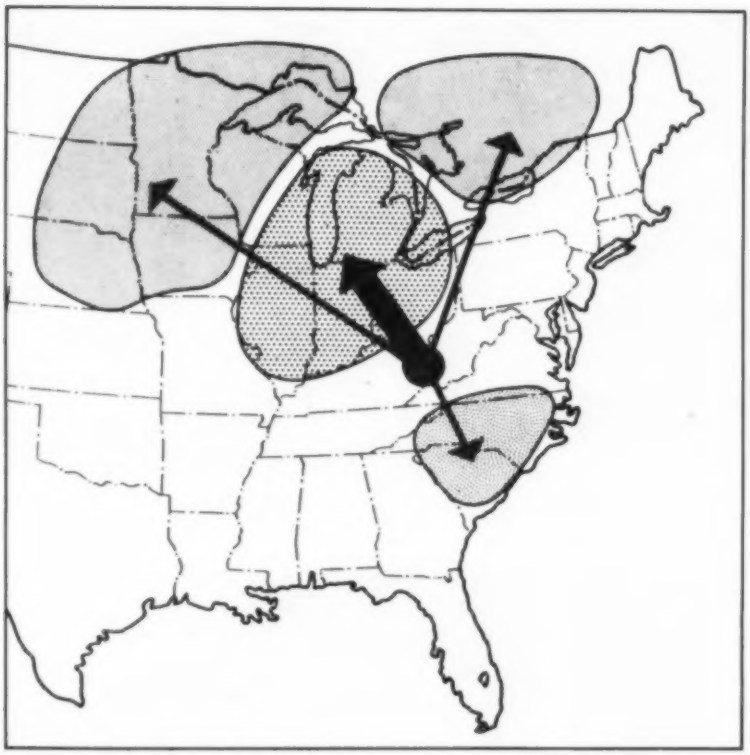
Betting on Retail Pays Off for

FALL AND WINTER PROMOTION KIT receives vote of approval by executive sales and advertising personnel of Princess Coal Sales. They are (left to right) Illa J. Pullen, advertising coordinator; Joseph E. Cooke, manager of sales; David L. Francis, president; James D. Francis, chairman of the board; Everett H. LaRue, vice president and general manager; Mrs. Willis White, general manager of distribution; and Robert A. Wimmer, manager of domestic distribution.

Gearing its sales organization to fit "today's" retail market and holding to its policies of quality and service to its customers, Princess Coal Sales stars as a forward-looking company specializing in coal for domestic use.

By Daniel Jackson Jr.
Assistant Editor, Coal Age

FROM THE BEGINNING, the management of Princess Coal Sales Co. has operated on the principle that an important part of its destiny is one with the retail coal market. They felt strongly that there was a stability and long-range potential in this market which was unique and which could



Princess Coal Sales

not be found in any other market. As a result of this policy and its implementation the company has consistently increased its sales to domestic retailers.

With headquarters in Huntington, W. Va., the Princess Coal Sales Co. is exclusively owned and operated by the Powellton and Princess Elkhorn coal companies. It merchandises the output of the organization's mines at Mallory, Logan County, W. Va., and David, Floyd County, Ky., respectively. Seventy percent of the Kentucky production goes to retailing concerns serving home owners and small and large commercial establishments, and the West Virginia production goes predominantly to by-product and industrial customers. Coal from the famous Elkhorn No. 3 seam produced at David, Ky., is marketed under the trade names of Patsy Block and Furnace, Patsy Home Stoker, and Patsy Plus Fifty. The fine coal (pulverizer) from this mine is, for the most part, sold by contract to utilities.

The Powellton Coal Co. produces coal from the Powellton and Cedar Grove seams at Mallory, W. Va., under the trade name of Jane Ann. Long recognized as a prime quality by-product and industrial coal in the United States, it has also gained good recognition and stature in the export market in the past 3 yr.

James D. Francis, chairman of the board of the sales and producing companies has maintained a policy that the function of the sales company is to sell the output of the production units at a fair level of price and profit. A believer in producer owned sales units, he is opposed to the sale of coal over which he has no control of production and quality.

WHY RETAIL? Opportunity For Quality Product

Why has Princess Coal Sales consistently stayed with the retail market and continued to count on it for the future? One answer might be that each year their sales to domestic retailers have increased, as indicated by the accompanying graph, in almost straight-line fashion in spite of the fact that the overall demand for retail coal has decreased. However, this growth is a result, not a cause.

Shortly after World War II the demand for home stoker coal was at a premium. All coal companies having a mid-fusion low-ash free-burning coal (and some that did not) made every effort to keep up with the growing demand for home stoker coals. At that time natural gas had not taken its toll of the space-heating market for lump and egg. During this period, according to Bureau of Mines figures, retail coal hit its peak of 125,000,000 tons in 1944 and continued at 100,000,000 tons, or above, until 1948, actually making this period the best for retail coal in the history of the business.

In the very late 40s, the demand for stoker coal leveled off. At this point Princess Coal Sales and several other companies, through the auspices of Appalachian Coals, Inc., made a survey under the direction of A. T. Kearney & Co., management consultants, of Chicago, to pinpoint the future of the domestic market. The results showed that:

1. Home stoker coal sales would remain constant for many years.
2. Commercial stoker demand would steadily increase.
3. The demand for lump and egg would decline steadily.

Events have proved the accuracy of these predictions.

Where oil and gas heaters and furnaces were installed replacing the hand fired domestic coals this tonnage was lost to the industry. However, when oil or gas replaced coal stokers many of the displaced units were rebuilt and installed in homes that saw the advantages of automatic coal heating over hand firing and over the heat of other fuels. Therefore, the demand for stoker coal has remained fairly constant.

Princess Coal Sales has penetrated this division of the retail market because it could offer a low-ash medium-fusion free-burning coal especially suitable for home stokers.

Commercial stoker is being recognized more and more by operators of hotels, apartment houses, schools,

NEW ADVERTISING PORTFOLIOS (left) are issued to retailers annually and offer newspaper, direct mail, radio and other merchandising helps. Postcards, such as that reproduced right regularly give customers quality reports.

QUALITY IS SAFEGUARDED by modern well-equipped laboratories at both mining properties. Truman Little is director of preparation at Powellton (left) and Earl McDonald is director of preparation at Princess Elkhorn (right).

STOCKPILING COAL helps insure customers of prompt delivery and provides employees with work during slack seasons.

CUSTOMERS AND GUESTS visiting Princess Elkhorn are lodged in this modern clubhouse. Mrs. Ora Howard is hostess.

office buildings and other units as the most economical and efficient from a cost standpoint. This market has grown. With it, Princess Coal Sales has grown by merchandising Patsy Plus Fifty, a commercial stoker coal for stokers burning 50 lb per hour or more. The combination of higher fusion plus low ash (2½%) and its flashy burning characteristics make it the "janitor's dream."

While gas and oil are generally hurting the demand for lump and egg, Princess Coal Sales, because of the premium quality of the product, expects to be selling to the domestic consumer long after poorer-quality prepared coals have gone off the market. But while quality is a big help it is only one of the three essentials in forging ahead in what is normally referred to as a static market.

E. H. LaRue, vice president and general manager, lists these essentials:

1. Producing a quality coal, properly sized, that will meet the needs of the domestic consumer and guarantee him burning satisfaction in every ton.

2. Creating an accepted pattern of service which will be understood by the retailers.

3. Encouraging and helping the retailer through advertising to the ultimate consumer, providing engineering service, and assisting in any other feasible way.

These principles have been closely followed during the highly competitive years as well as those years when the retail market was at its peak. As a result, the Princess organization has established an impressive company-consumer relationship under which dependability and quality are unquestioned.

SELLING THE MARKET: Facts, Organization, New Approaches

Without question a great deal of the success that Princess Coal Sales has achieved in the retail coal market is because it has constantly designed its program to meet the requirements of "today's" domestic market conditions. Among other things it provides a very substantial advertising budget for the use of its retailers, and an advertising program that is constantly refined and kept current.

There are no big accounts in this market. The average retailer may buy from 5 to 100 cars of coal per year. Therefore, each salesman must call on many customers in a concentrated territory. This is in extreme contrast to the large by-product and steam accounts which buy from 50,000 to 500,000 tons often in one purchase.

Gearing its sales organization to this type of market, Princess Coal Sales again called on A. T. Kearney & Co. to evaluate its own sales program. The results of this survey were used to shape the present sales organization and to develop new sales techniques and approaches.

The workload and territory of each salesman were carefully analyzed. Evaluation indicated that each salesman should make an average of six calls per day and should travel some 250 days per annum. This means that 1,500 sales calls would be made yearly. An analysis of calls revealed that to properly service a domestic account required from 6 to 12 visits per year. Therefore, each territorial representative should not have over 200 customers and prospects to call on, and the size of his sales territory was adjusted to fit this pattern.

The value of each customer and prospect is constantly analyzed by the home office. The performance of the territorial salesman is constantly checked to make certain that he is spending his time in the right places. To keep him functioning at his peak each representative is regularly provided with new sales material.

Princess Coal Sales has an outside advertising counsel to advise it on the advertising phase of its merchandising program. It is set up so that the lion's share of the responsibility for handling the many advertising details is centered in the Huntington office under the able direction of Illa Jayne Pullen. Miss Pullen attends to all details. The emphasis is on proper timing and well-planned sales approaches with the aims of explaining to consumers the advantages of purchasing Patsy coal and keeping them sold after the initial order.

In the spring, the fill-up advertising campaign reaches the public, urging summer stocking. The program is designed to reach home owners and commercial establishments through the newspapers and by direct mail, radio and telephone.

The winter advertising campaign stresses the quality, dependability, high heat and fine burning characteristics of Patsy Coal. This is presented in a colorful brochure offering a well-rounded program of various-size newspaper advertisements plus direct mail, radio, and many other merchandising aids to be integrated into a complete advertising program. It is designed to fill the needs of each individual retailer.

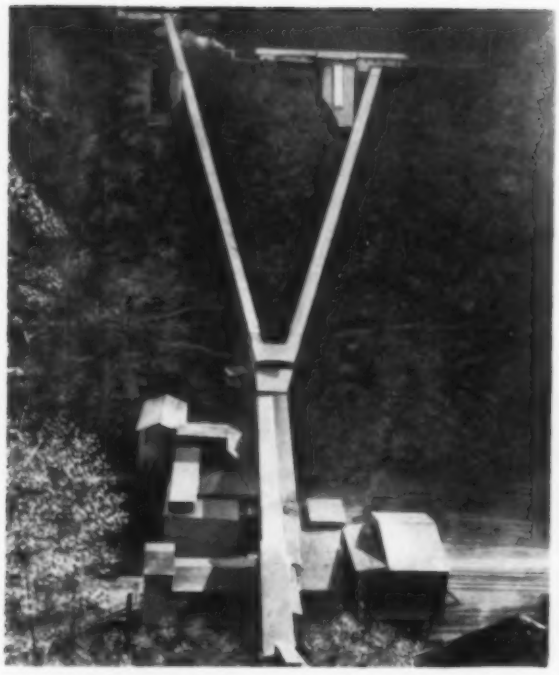
Postcards with attractive company pictures are periodically sent to customers by the preparation director to inform them of the ash content of the coal being shipped to them. This has proven to be a good merchandising tool. The retail merchant uses these cards to show his customers the quality of Patsy coal. Other analytical information is furnished upon request.

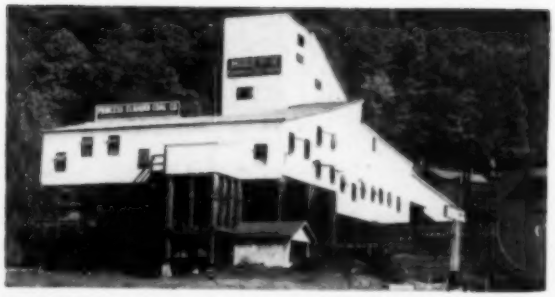
Bonuses are given to all salesmen who better their quotas. In fact, the management of the sales company and both operating companies are great believers in incentive programs. All salaried employees are on some type of incentive, each tailored to fit the individual situation. The bonus plan for territorial salesmen is based on a quota of what can be reasonably expected of the salesman in that territory. Any coal sold above that quota warrants a bonus.

Last year the highest bonus paid was approximately $1,000. This does not include additional bonuses paid for short-term promotions for a special-size coal or a particular sales project. During the fall a drive for new stoker customers may be launched. It includes a bonus for the salesman who secures the most new accounts plus increased tonnage.

As a result of these sales policies, 70% of the Princess Elkhorn production of 1,250,000 tons per year goes into the retail market, either direct from the mines or via the lakes. As previously noted, the remaining 30% is sold to utilities in the form of carbon or pulverizer coal. The Powellton production is 1,500,000 per year with a daily output in 1957 ranging from 6,000 to 6,500 tons. Powellton is geared to handle 7,000 to 7,500 tons daily, and this could be increased to 9,000 tons. The reserves of each of the two producing companies is 50 yr.

Home Office Sales—While it takes 13 Princess salesmen to handle domestic accounts totaling over half a million tons per year, moving direct from the mines, it requires only five





QUALITY STARTS AT THE COAL FACE and is enhanced by modern cleaning plants at Princess Elkhorn.

PREPARATION PLANTS of the Powellton Coal Co. (left) illustrate how headhouses and storage bins serve the Powellton Seam (upper left) and Cedar Grove Seam (lower right). Powellton plant (lower right photo) features modern design.

salesmen to handle large accounts who buy the remaining two million tons per year of Patsy and Jane Ann coals. This small sales force includes James D. Francis, chairman of the board; David L. Francis, president; Everett H. LaRue, vice president and general manager; Joseph E. Cooke, manager of sales; and Mrs. Willis White, general manager of distribution. Each of these executives has his own special accounts and works closely with these customers.

A careful, conservative sales policy of annual contracts on a fixed-price basis to customers of long standing, and with practically no turn-over, has resulted in a record of probably the best running time over a period of years experienced by any company in the commercial market. Princess Elkhorn has lost only 38 days for lack of orders in the past 12 yr, most of these in one year.

While Princess Elkhorn is concerned primarily with the retail market, Powellton's interest is in the by-product, industrial and export markets which gives Princess Coal Sales broad coverage of all coal markets.

Most Powellton coal is sold under firm contracts and is moving at specified tonnage rates to customers who have been using this coal for many years, thus adding stability to the operation. The Powellton Coal Co. and its predecessor, The Mallory Coal Co., have an operating record of approximately 40 yr. The Mallory operations worked out after 20 yr of production in 1943, at which time the Powellton Coal Co. was organized and commenced operations in the same area under a new leasehold. The result has been many years of high quality coal and good service for Powellton customers. Firm contracts enable the company to plan production, and future expansion and improvements, on the basis of a stable demand.

Both the Powellton and Cedar Grove seams are excellent coking coals with the Powellton ash ranging from 4.25 to 4.50. The Cedar Grove is 1% higher. The sulphur range is from 0.60 to 0.80, respectively, and the free swelling index 8 to 9. Consistency of quality has made Powellton a prime by-product coal.

A percentage of Powellton's coal has been moving, in recent years, into the export market. Much of it is sold on the basis of long-term contracts with a relationship similar to that which exists between the company and its customers in this country.

Visitors Welcome—The production departments also are sales conscious. In fact, William (Bill) Crawford, vice president in charge of operations, encourages the sales company to bring customers to visit the mines. As Mr. Crawford puts it, "It keeps our operating departments aware of sales problems and brings home to the customers the problems we at the mines have in providing the product they desire."

This policy has been very effective and each year 15 to 20 trips are organized for customers of Princess Coal Sales. Visitors are flown to either the company's private airports at David, Ky., or Mallory, W. Va., in company planes and are conducted on special tours of the preparation plant, laboratories and underground operations. C. T. (Court) Dahlin, general manager, and Gene Matthis, general superintendent for Princess Elkhorn, and A. E. Spotte, general manager for Powellton, along with the entire staff, are always on hand to conduct and explain all phases of the operation. Guests enjoy the friendly hospitality extended to them by the staff.

QUALITY CONTROL: Crux of Consumer Acceptance

Regardless of the effort and promotion put forth by the sales organiza-

tion, the real selling factor is good coal made acceptable by consistency and good service. Consequently, carefully worked out inspection and quality-control programs are in effect at the operations of both producing companies. The programs include not only visual inspection but also careful control of the washers and an evaluation of the quality of coal in each railroad car by laboratory analysis.

Patsy coal is produced from a nearly pure seam which contains no partings or impurities. However, as the coal is removed, a small amount of foreign matter comes with it, but less than 3% of the raw product from the mine is sent to refuse banks. Only after the raw product has been processed through either of two modern preparation plants and analyzed is it "tagged" Patsy coal (small aluminum tags stamped with the Patsy trademark are placed in each car of Patsy Home Stoker and Patsy Plus Fifty to identify the coal as such.)

What does quality control mean to Princess Coal Sales? It is the all-important link between the company and the consumer and serves a two-fold purpose. First, it insures the consumer of a premium quality product that has been cleaned, sized and analyzed. Second, it is additional proof to the company that, quality-wise, its product will meet the most exacting demands of its customers.

To provide quality control, the company has two modern laboratories at David and Mallory. Earl McDonald and Truman Little, preparation directors at Princess Elkhorn and Powellton, supervise all activities and see to it that the sales department requirements are met at all times by correct preparation procedures. Quality control and preparation standards are established for both Princess Elkhorn and Powellton which will assure each customer the very best obtainable in the way of quality and sizing. It is the responsibility of the preparation director in each instance to see that the customer receives the kind of coal he purchased.

Channel samples and sample by sections are taken regularly to insure the quality of the product as it comes from the mine. Channel samples are taken at the face and permit an analysis of the coal as it occurs in the seam by section and by entry.

Sampling by section consists of collecting coal from approximately 15 mine cars before it is processed. This provides data on the quality of coal from a complete section. If the analysis shows an increase in ash, channel samples are taken in each entry of that section to determine the cause and lay the ground for corrective steps.

Coal is also continuously sampled at the preparation plant. Every car of pulverizer coal is examined for ash. Should the ash suddenly increase, indications are that the raw product has foreign material in it. Immediately measures are taken to eliminate the difficulty. Should the ash in the pulverizer remain constant but increase in the other sizes, very probably something is wrong in the washing plant. Again, corrections are made at once.

Aside from offering a low-ash coal, the company makes every effort to make sure that the quality of coal remains the same whether it is purchased this year or next. To provide this uniformity coal from the working sections is constantly checked to insure a standard blend at the plants.

STOCKPILING: Customer Help, Uniform Running Time

Stockpiling domestic coals has become one of Princess Coal Sales' most valuable assets. David L. Francis, president, puts it this way: "By carrying an inventory, we are able to insure our customers of prompt delivery on large as well as small orders. Then, too, we are able to provide our employees with more work during slack seasons."

During the summer months a great portion of Princess Elkhorn coal goes to the lake market. However, the lake demand for block and furnace is rather light, resulting in an over production of these sizes. This coal is stored near the Princess No. 2 tipple in a well-planned area measuring about one city block square and stacked 16 ft high. In the winter when the demand for block and furnace is greater than can be produced, this stored coal is picked up and again processed through the preparation plant and remixed with the coal coming from the mines. The sales of home stoker coal begins to lag during the early part of the winter, thus creating an excess of stoker coal. Approximately 30,000 tons are stored adjacent to Princess No. 1 tipple at this time and reprocessed when the demand increases.

DISTRIBUTION: South, Middle And Northwest, Canada, Export

Princess Coal Sales has a wide area of retail distribution. It has almost 2,000 retailers as customers. Its primary domestic market is in the states of Ohio, Michigan, Indiana, Illinois, N. Carolina and S. Carolina. A large tonnage moves via both rail and the Lakes into neighboring Canada. Distribution in Canada is extensive, reaching from the western provinces to Ontario and Quebec. Weaver Coal Co., Ltd. has served as exclusive sales agent in Canada for Patsy coal since the start of the operation.

Coals also move by Lake to the upper lake ports and from there is distributed by the C. Reiss Coal Co. throughout Wisconsin, Minnesota, N. Dakota, S. Dakota, Iowa and Nebraska. Wisconsin Ice & Coal Co. distributes Patsy in Milwaukee area.

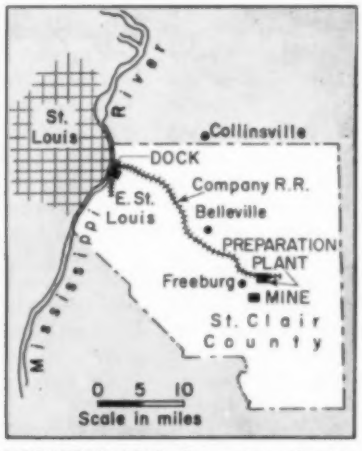
The distribution pattern of The Powellton Coal Co. is to a few select large-tonnage customers. This coal moves all-rail from the mines via the Great Lakes and to tidewater for export and coastwise movement. It is also shipped to Huntington, where it is dumped into barges for movement on the river network. The entire distribution of coal is conducted from the main office in Huntington by Mrs. Willis White, general manager of distribution, and R. A. Wimmer, domestic manager.

"Princess Coal Sales expects to continue its growth in the retail market," says J. E. (Joe) Cooke, manager of sales. "There is no reason why we cannot continue this growth if we hold to the policies of concentrated coverage and service to our customers. We are looking forward to many future years of service to the retail coal merchant and to the domestic consumer."

The story of Princess Coal Sales Co. is one of providing service and quality products to its customers by a well-integrated team of sales and production men. It is a story of steady, continual growth—approximately 15% per year since its inception in the very early 40's—and of careful planning for the future growth which will maintain this growth in tune with the economic progress of this nation and the coal industry. By adherring to the policies which have made it a successful organization, it will surely be able to meet future demands.

GIANT 70-YD SHOVEL, the world's largest, sets the pace at River King mine. Unit is first of three similar excavators to be owned or operated by Peabody.

PREPARATION PLANT is first in coal while including complete washing, crush-



LOCATION MAP shows sites of mine, plant, company railroad, river and cities.

70-Yd King of Spades:

Giant shovel takes 70-yd bite every 50 sec in 70-ft cover at new Peabody mine serving markets by rail, water and truck. Stainless-steel clad plant processes 1,000 tph for delivery over company railroad to 1,500-tph dock.

By A. E. Flowers
Associate Editor, Coal Age

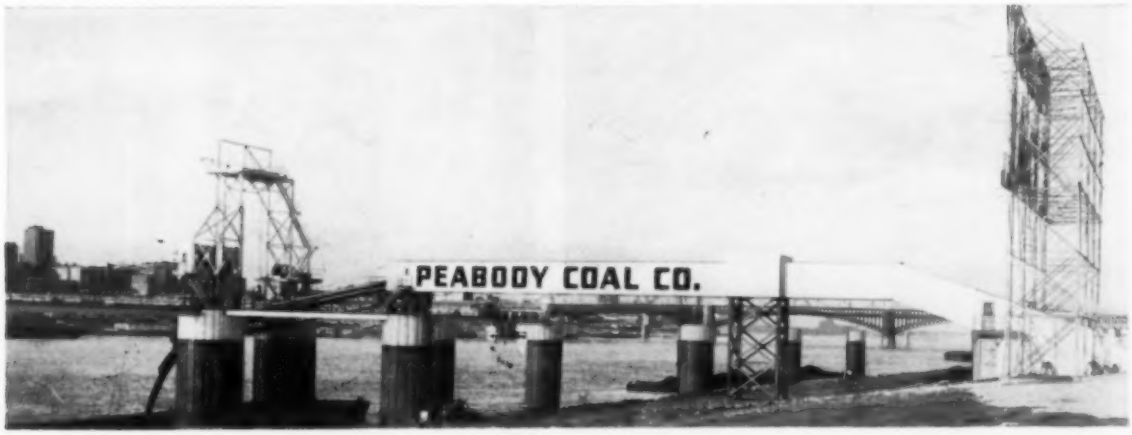
THE WORLD'S LARGEST stripping shovel, Big Paul, The King of Spades, wears a mighty big crown at the Peabody Coal Co.'s River King mine near Freeburg, Ill. Swinging the world's largest dipper, Big Paul chews up overburden in 70-yd bites and can uncover coal at the rate of 2 million tons per year. It digs, hoists, swings and dumps a 105-ton bite in 50 sec.

Many other unusual features mark the River King operation. For example, the preparation plant is the first to be entirely sheathed in stainless steel.

The River King barge-loading dock, one of the largest heavy-duty docks on the inland waterway system, is a fast, efficient operation run by three men. Coal in hopper cars is automatically unloaded, moves at a speed of 650 fpm over a new-type 48-in belt conveyor a distance of 360 ft to the barge loading point. It flows into barges at the rate of 1,500 tph.

The groundwork for the River King mine was laid early in 1953 when the company started looking for a dock site in East St. Louis. The company already had vast reserves of Illinois No. 6 coal in the Belleville area and needed access to the Mississippi River to provide low-cost river transportation to power-generating customers in the midwest. It took a full year for the company to locate and secure the present site.

industry to be sheathed in stainless steel. Designed to process 1,000 tph, plant has minimum of chutes, flumes and conveyors ing, screening and drying facilities. Clean coal may be delivered to customers by rail, water or truck.



RIVER DOCK has 14 cells made of steel sheet piling backfilled with sand and gravel. Level section of conveyor housing is above high water mark. Barges are handled by a small switching boat.

Pacesetter at New River King

As soon as the dock site was acquired, Peabody engineers made a preliminary layout of the mine, preparation plant, railroad link between plant and river, and barge-loading facilities on the Mississippi River at East St. Louis. This engineering work took 6 mo.

While the engineers were making the preliminary layout, the company bought the St. Louis & Belleville Electric Ry. Co. and right of way. This provided the company with an independent transportation link between the mine and the river.

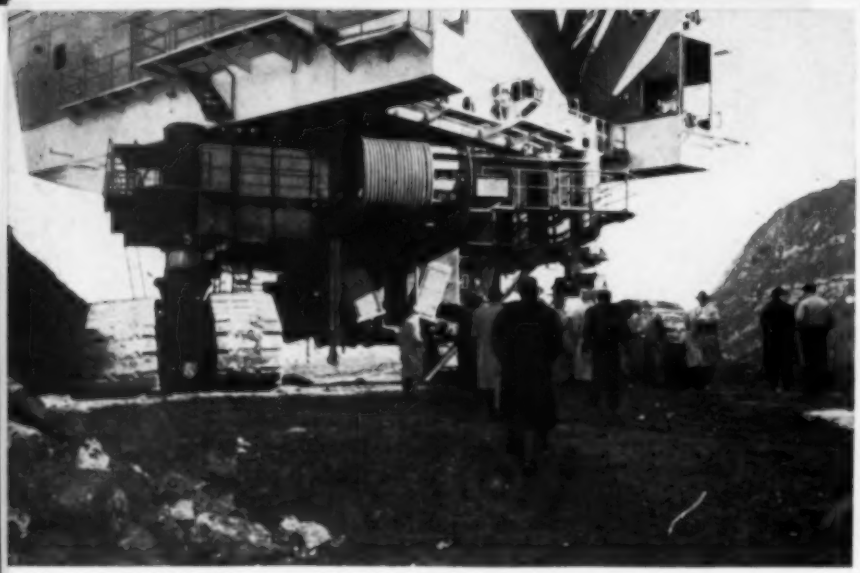
Actual construction work on the preparation plant, railroad, dock and shovel was started in the summer of 1956. It took 6 mo to erect the shovel, after which it went to work in an old strip pit, uncovering coal while the remainder of the construction work was being completed. The first coal was processed in the McNally Pittsburg preparation plant on Aug. 5, 1957.

Peabody's barge-loading facilities are located at E. St. Louis between MacArthur and Eads bridges. The railroad between the river and the preparation plant is 23 mi long. Of this, 14 mi was built by the company from the preparation plant toward the river, connecting to the St. Louis & Belleville which was 9 mi long itself. Peabody owns another 10 mi of right of way that will permit the railroad to be extended deeper into the coal field when nearby reserves are mined.

River King is designed for a long life—at least 50 yr. Potential output is 4,000,000 tons per year, with coal coming from both deep and strip operations. Coal now is produced entirely by stripping. But the preparation plant is centered over 100 million tons of coal that will be tapped by a slope near the plant. The company plans to use the most modern continuous-mining equipment and methods to recover the deep coal.

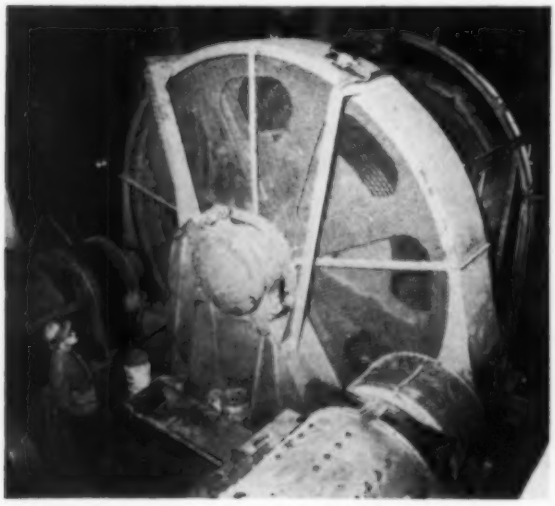
The Big Shovel

Big Paul towers 103 ft 6 in above the ground to the top of its A frame. It stands 147 ft 6 in above the ground



PROPEL UNITS, located at four corners of lower frame, include pair of independently pivoted frames. Each has its own electric motor.

ONE MAN controls motions of giant shovel from air-conditioned cab.



MAIN HOIST machinery, powered by four 230-V 500-hp motors, is 13 ft high. Weight of revolving parts is 79,353 lb.

ELEVATOR transports passengers three floors inside shovel and can be operated automatically while the shovel is digging.

OVERBURDEN DRILLING is done at corners of 27x27-ft squares. An auger bores through upper layer of soft material.

EXPLOSIVES are stored in large trailers at mine, transferred to 5-ton wagons for delivery to drill site.

SPECIAL twin-armed drill on tractor chassis puts down 2½-in holes in coal.

COAL LOADING SCENE includes 10-cu yd electric shovel and 55-ton tractor-trailer coal haulers. Fleet of 12 trucks hauls coal 5 mi to preparation plant.

Facts About the 70-Yd Shovel

Dipper capacity	70 cu yd	Cutting radius at 23 ft elevation	131 ft 0 in
Boom length—centers of foot pin and point shaft	140 ft 0 in	Radius of clean up	82 ft 6 in
Dipper handle length, including dipper	83 ft 3 in	Hoist drums, pitch dia.	72 in
Crowd handle length, effective	59 ft 0 in	Hoist motors, four, 500 hp (cont. rating) each, blown, total	2,000 hp
Stiff leg length between centers	64 ft 0 in	Bail pull, maximum	550,000 lb
Boom point sheaves, pitch dia.	90 in	Swing motors, four, 187½ hp (cont. rating) each, blown, total	750 hp
Dipper padlock sheaves, pitch dia.	68⅝ in	Crowd motors, two 187½ hp (cont. rating) each, blown, total	375 hp
Hoist cables, two, double-hitch, dia.	2⅜ in	Propel motors, four, 250 hp (cont. rating) each, total	1,000 hp
Boom support cables, bridge strand, four, dia.	3⅜ in	Steering motors, two 40 hp (cont. rating) each, total	80 hp
Working ranges:		Alternating current driving motors, total	4,400 hp
Boom angle	49 deg	Generator capacity	to suit motors
Dumping height—maximum	96 ft 6 in	Weights, approximate:	
Dumping radius at maximum height	130 ft 3 in	Domestic shipping, ballast not included	4,640,000 lb
Dumping height—over spoil	87 ft 3 in	Working, including ballast	5,790,000 lb
Dumping radius—effective over spoil	109 ft 0 in	Ballast	1,150,000 lb
Dumping height at maximum radius	68 ft 6 in		
Dumping radius—maximum	136 ft 6 in		
Cutting height—maximum	127 ft 0 in		
Cutting radius at maximum height	131 ft 6 in		
Cutting height at maximum radius	75 ft 6 in		
Cutting radius—maximum	148 ft 0 in		

at the tip of the boom, which is 49 deg with the horizontal. Designed by the Marion Power Shovel Co., and fitted with General Electric power units and controls, the gigantic shovel was erected at the mine. It took 75 railroad cars to carry the various components to the mine site. And it took skilled erection crews nearly 5 mo to assemble the shovel.

Aside from being the largest shovel in the world, Big Paul has some other outstanding features. Electrical energy is delivered at 7,200 V, a new high for stripping service. All-welded construction and the use of high-tensile alloys in the front end provide maximum strength with minimum weight.

The dipper handle is made of T-1 alloy steel U-section members, made with large corner radii, welded toe to toe to form a box section. A safety cable extends through the handle its full length to hold the parts together in case of accident.

The crowd handle is made of alloy steel plates welded into a box section with a center web plate. Racking is of alloy steel; teeth are machine cut to special high-strength form and are hardened.

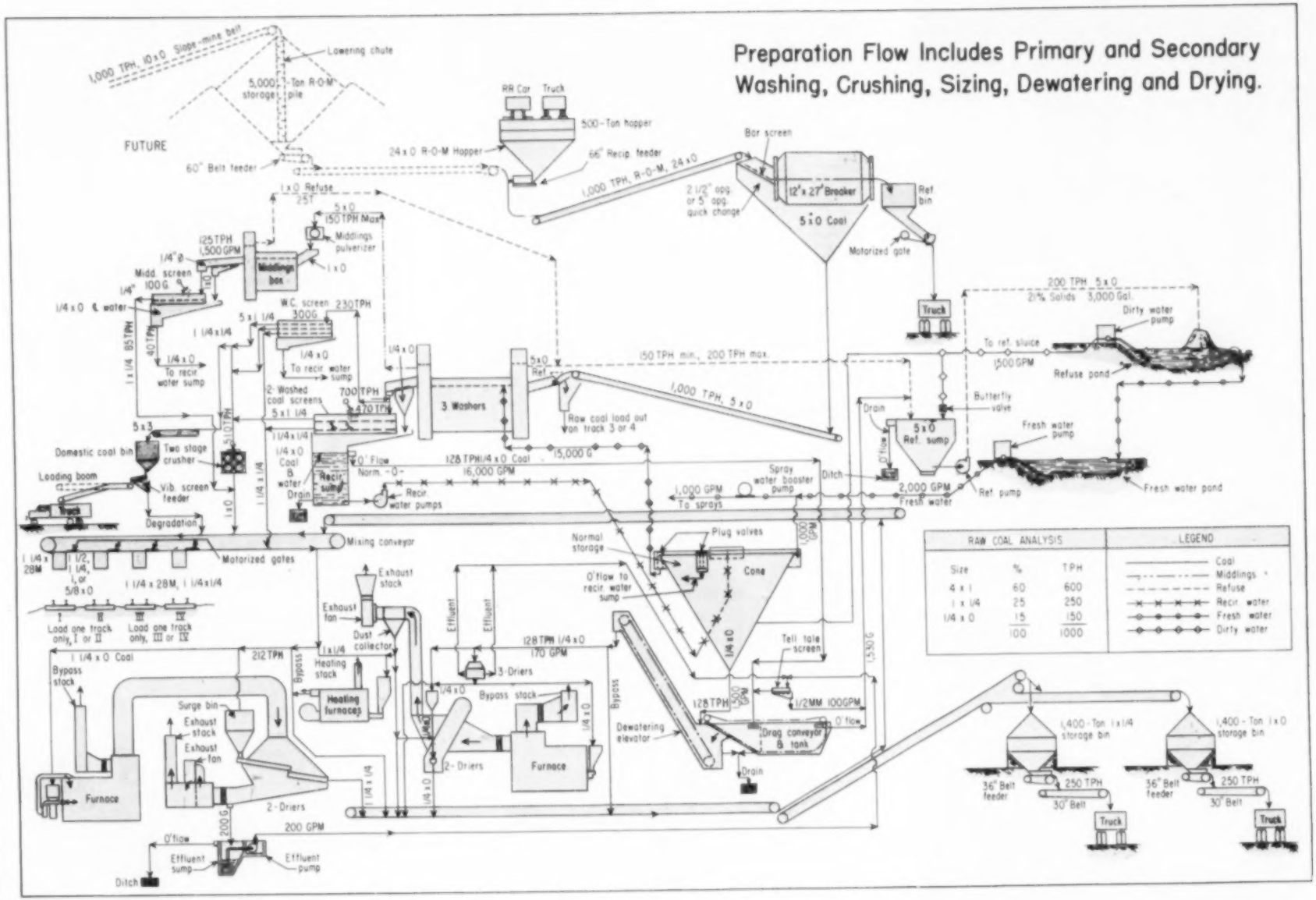
The stiff leg, welded A frame, and the boom are made of Tri-Ten alloy steel. Each side member of the boom consists of four alloy-steel chord lacing at the sides. Each of the two angles with special-grade steel pipe

point sheaves has machined grooves, turns on antifriction bearings and is mounted in a separate swiveling cradle to conform to hoist rope angle. Bail and sheave blocks also are made of T-1 steel.

The dipper is all welded T-1 steel, strongly reinforced and the lip is flame cut from solid T-1 alloy steel slab. Tooth bases are flame cut and machined from forged alloy steel and welded to the lip. Tooth points are reversible, cast alloy steel. The dipper is welded to the handle.

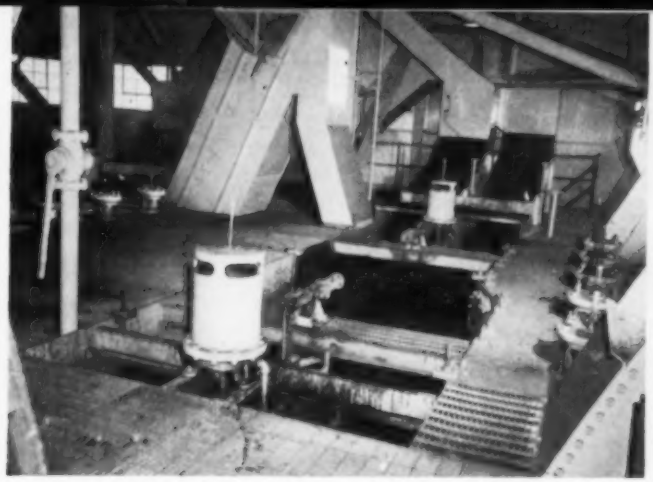
Four independent propel units, one at each corner of the lower frame, support the machine. Each unit includes a pair of crawler frames pivoted independently of each other

Preparation Flow Includes Primary and Secondary Washing, Crushing, Sizing, Dewatering and Drying.

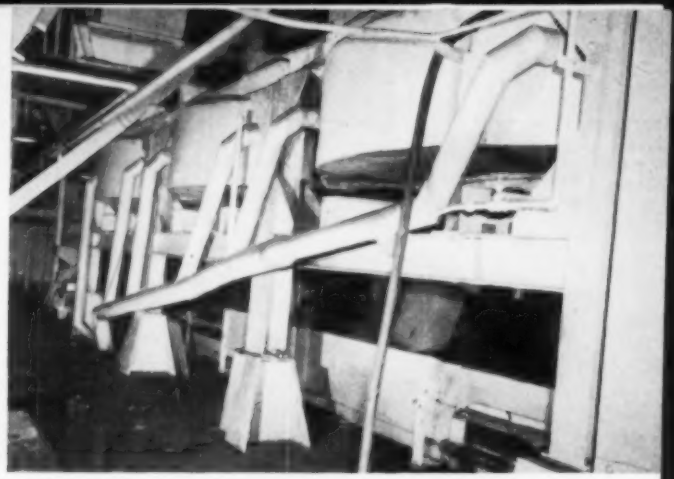


RAW COAL ANALYSIS		
Size	%	TPH
4 x 1	60	600
1 x 1/4	25	250
1/4 x 0	15	150
	100	1000

LEGEND
- Coal
- Middlings
- Refuse
- Recir. water
- Fresh water
- Dirty water



PRIMARY CLEANING is done by three wash boxes, receiving equal portions of feed. Middlings are crushed and recleaned.



MECHANICAL DEWATERING is by a battery of three centrifugal driers receiving feed from dewatering elevator.

on a cast-steel axle housing, a welded steel saddle pivoted to the axle housing and clamped rigidly to the Meehanite leveling jack by a bolted split shear collar. Mounting provides universal movement with respect to the lower frame, permitting it to swivel for steering and to adjust itself to the contour of the supporting ground surface. The outer side of the propel units, including the gear cases, are protected by shields of heavy steel plate.

Each of the four propel units is driven by its own electric motor. Independent drive provides differential action when the machine travels around a curve. Steering is by two electric motors, one serving the front propel units, the other driving the two rear units.

An electric elevator capable of carrying three persons or 1,000 lb travels in a shaft passing through the shovel's hollow-center journal. It is pushbutton controlled and has all the safety features required for passenger operation. It serves three stations, a sub-platform under the lower frame, the upper frame deck and a sub-platform on the gantry.

Mining Conditions

Overburden on the Illinois No. 6 coal at River King averages 70 ft in thickness. In some areas the cover will be as much as 100 ft thick. In an average pit the cover, beginning at the surface, is as follows: 31 ft of surface material, 5 to 10 ft of weathered Cutler limestone, 20 ft of shale, 5 to 12 ft of Herrin limestone, and 1 to 2 ft of shale on top of the coal. Sometimes the lower bed of limestone lies immediately over the coal.

CENTRALIZED CONTROLS simplify operation of 1,000-tph River King preparation plant, reducing man power required to a minimum.

The coal bed itself varies from 6 to 10 ft in thickness and has a 1½-in clay parting about one-third of the distance from the bottom. It is undulating and dips as much as 5% in some areas.

Drilling and Blasting

Two Bucyrus-Erie 50R rotary dry-type drills handle the overburden job at River King. Each works three shifts, 7 days per week to keep pace with the 70-yd shovel. A three-man crew, made up of a driller, driller helper and shooter, operates each of the drills.

Blastholes usually are drilled at the corners of 27x27-ft squares. An 11½-in-diameter auger is used to bore through the soft surface material. Then a Hughes 10⅝-in W7R-J Aerojet Triocone bit is used to complete the hole. The bit penetrates up to 4 ft of the coal before drilling is stopped. This is done to prevent the drillers from being deceived by an irregular rider seam that sometimes lies above the cap rock. Holes are backfilled to the top of the coal before explosives are loaded.

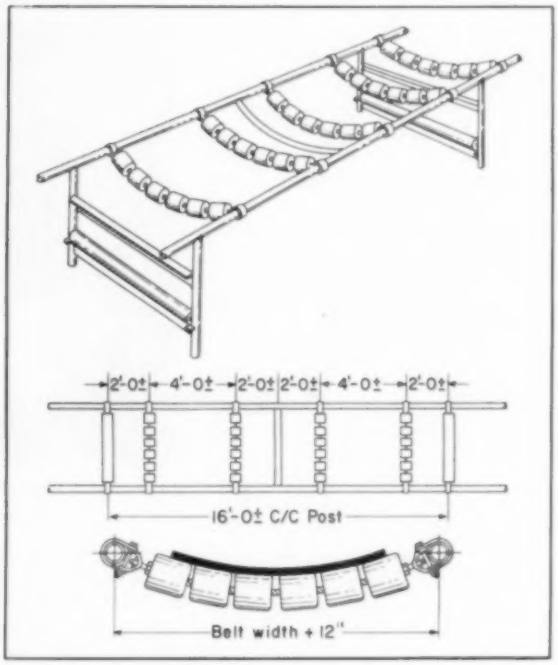
Each crew drills an average of 500 ft of hole per shift. Bit life varies from 5,000 to 15,000 ft, depending on the hardness of the rock.

As soon as a hole is completed, the shooter backfills it to the proper height. An average of eight 50-lb bags of ammonium nitrate and fuel oil mixture and four primers are used in each hole. Loading, beginning at the bottom of the hole, is as follows: 1 bag of ammonium nitrate, primer, 3 bags of ammonium nitrate, primer, 2 bags of ammonium nitrate, stemming to the Cutler limestone, 2 bags of ammonium nitrate and primer if the limestone is over 7 ft thick but 1 bag of ammonium nitrate and primer if the rock is less than 7 ft.

FINAL DRYING is assigned to thermal units. The 1¼x¼ is processed in driers at left and ¼x0 in right units.

FULLY LOADED belt with flexible troughing idlers moves 1,500 tph to barges on Mississippi River

CLOSE-UP VIEW shows 5-in rollers mounted on wire rope fitted to socket connecting to pipe support.



SIMPLE AND RUGGED conveyor has minimum of framework, needs no lubrication. Idlers adjust to any belt slope.

New-Type Belt Conveyor Moves 1,500 tph at Peabody Dock

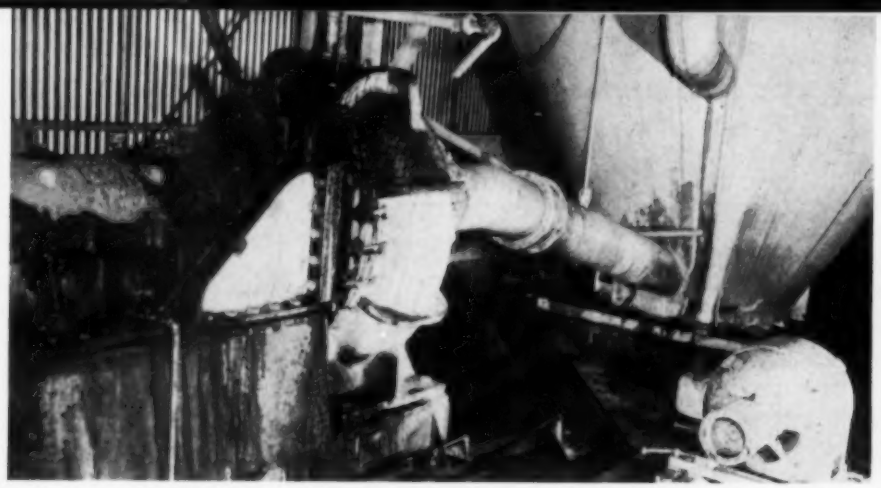
Carrying 1,500 tph of coal at 650 fpm is the job assigned to a new-type belt conveyor in use at Peabody's barge-loading dock at East St. Louis. Designed with flexible-type troughing idlers, the new conveyor features simplicity, ease of assembly, easy alignment, shock absorbing construction and lower cost. Supplied by the McNally Pittsburg Mfg. Co., the conveyor is the third of its kind in service at Peabody plants. Some of the idlers were first installed about 2 yr ago on a rock belt at the Ken Coal Co. The company now has them at the East St. Louis dock and the River Queen plant.

Each flexible troughing idler consists of 5-in rollers secured to a wire rope at 6-in intervals. Each roller has a 5-in face and has its own prelubricated ball bearing. The number of rollers per idler depends on the belt width. As the belt gets wider and heavier, more rollers are used. The cable does not turn or twist when the belt is in motion, all movement being in the rollers.

Each end of the wire rope is connected by a clamp to a 2-in pipe of the framework, or can be connected to ropes if desirable. The idlers are easily adjusted for training the belt by sliding them along the pipe.

A bolt and socket joint at each end of the wire rope permits the rollers to hang vertically regardless of the inclination of the conveyor.

Return idlers are assembled on the H frame of the conveyor. An H frame is installed every 10 ft and troughing idlers are mounted on 4-ft centers.



REFUSE PUMP picks up 5x0 refuse from sump (left) and pushes it 600 ft through a 10-in pipe to refuse pond (right).

All holes are stemmed to the collar.

Austin detonating fuse is run to the first primer inserted in each hole and a du Pont 17-MS delay connector is used between holes in each row. Between rows, 17- and 9-MS connectors are used.

There is no set rule on the number of holes that are detonated in a blast. The location of the coal loading shovel governs the time of detonation and number of holes per blast. As soon as the coal shovel removes the previous cut of coal and is at a safe distance, a group of holes is detonated. As many as 192 holes have been set off at a time. During the month of October, 3½ cu yd of overburden was broken per pound of explosive.

The bagged ammonium nitrate and fuel oil mixture is delivered to the mine by trailers in 34,000-lb lots. These are parked at a central point where field wagons pulled by Caterpillar D4 tractors can be loaded conveniently. Each wagon has a capacity of 5 tons and is pulled to the drill site where explosives are transferred directly to the blastholes.

The company also is experimenting with on-the-spot mixing of explosives. Ammonium nitrate prills, supplied by du Pont, are delivered to the drill site in 50-lb bags. While blastholes are being drilled, bags of prills are placed at each hole and opened. Then 2 qt of No. 2 fuel oil is poured into each bag and left to percolate down through the prills. Approximately 450 lb of the prills are poured into each hole and detonated with a du Pont 7-in 25-lb Hicap primer.

ON THE WAY to the river dock, diesel locomotive pulls 35 cars over 23 mi of company-owned track. Company plans to add two more tracks at plant.

Loading and Hauling

After the overburden is blasted, the giant 70-yd shovel uncovers a new 40- to 50-ft strip of coal, making total pit width 60 to 70 ft. When the big machine made the first cut, a 20-ft berm was left for a truck roadway. Thus total pit width is about 70 ft when a new cut is made. A Caterpillar D9 works with the 70-yd shovel and removes loose material that cannot be efficiently handled by the shovel.

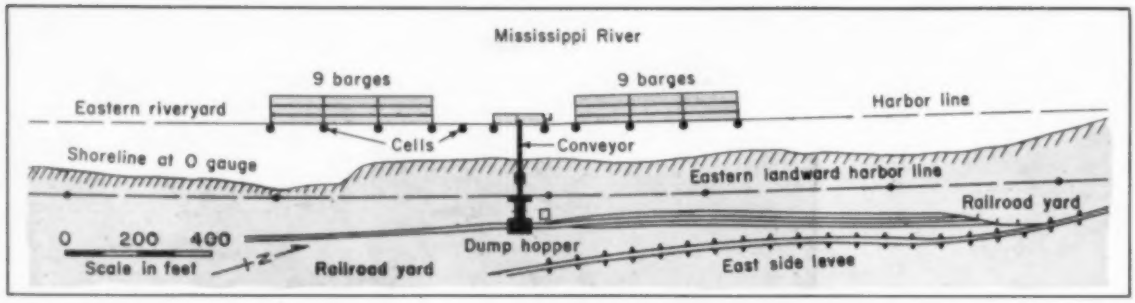
Coal must be blasted before it is loaded. But before the coal drill goes into action a Caterpillar D8 bulldozer removes any remaining fine material from the top of the coal.

The coal drill is a special twin-arm unit mounted on a Ford tractor chassis. Two Parmanco electric drills, fitted with Coalmaster augers, Parmanco drill head and 2½-in Carmet or Firthite bits, are operated by the tractor driver. Each drill is powered by a 5-hp 125-V DC motor and is fed hydraulically. The two drill arms are spaced 10 ft apart. Distance between each pair of holes is 15 ft, but may be increased or decreased depending on the hardness of the coal.

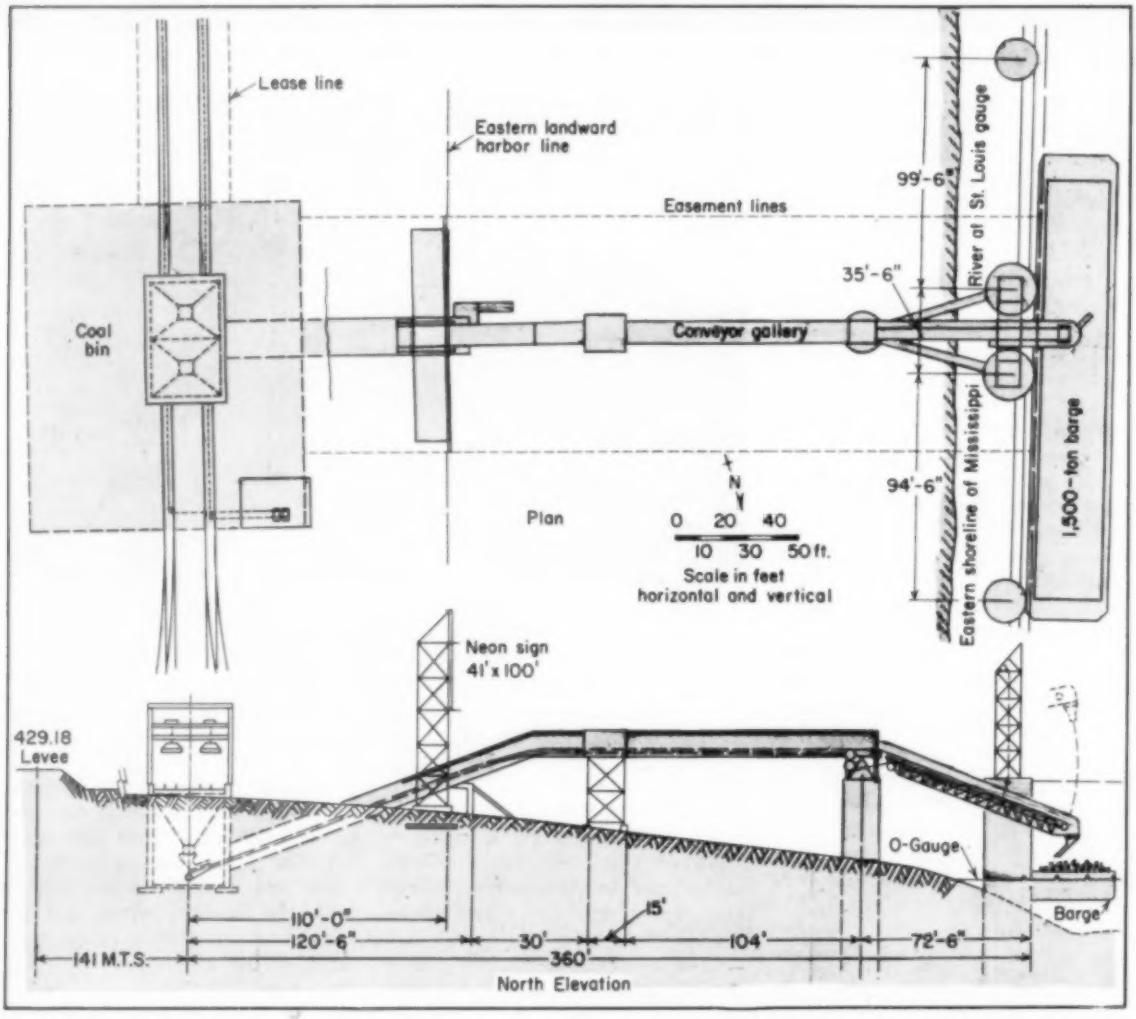
Two types of explosives are used to break the coal. Either Olin Mine Gel No. 2 or ammonium nitrate mixed with fuel oil or coal dust is used. The company reports that the ammonium nitrate works efficiently in the 2½-in holes and produces fewer fines, thus decreasing the load on the preparation plant.

Charging of holes with ammonium nitrate is done as follows. One stick of 1¾x6-in Mine Gel No. 2 with a No. 6 cap is placed at the bottom of the hole. Then three or four cups of ammonium nitrate treated with fuel oil or coal dust are poured into the hole. Holes are stemmed to the collar and detonated separately.

When Mine Gel No. 2 is used to



DOCK LAYOUT includes space for nine barges on each side of loading conveyor. Future plans call for expanding facilities.



PLAN AND PROFILE VIEWS show details of hopper and conveyor gallery. Hinged loading boom has 42-ft range.

break the coal, an average of three sticks are used per hole and each charge is set off separately.

Up to the end of November a Bucyrus-Erie 170B electric shovel with a 10-cu yd dipper handled the coal loading assignment, working only on the day shift. To increase coal loading capacity, the company recently moved in a Marion 480 shovel with a 5-cu yd dipper. With these two machines the company expects to load an average of 10,000 tons per shift.

Coal is hauled by a fleet of 12 Euclid 35-ton tractor trailers a distance of 5 mi to the preparation plant. Eight of these units were purchased new and others were brought in from other operations. Trailers have a struck capacity of 62 cu yd

HINGED BOOM with revolving loading chute feeds 1,500 tph of coal to barges.

BELT SCALE weighs coal on way to barges on belt traveling 650 fpm.

and heaped capacity of 70 cu yd.

Tractors are powered by Cummins NRTO-6 335-hp turbocharged diesel engines and are fitted with Fuller Road Ranger R-1150 9-speed one-stick transmissions. Tires are Goodrich and Firestone 18.00x25 24-ply duals and 14.00x25 20-ply singles.

The 9-speed transmission is designed to provide travel speeds ranging from 2.8 to 33.9 mph when engine speed is 2,100 rpm. But the units have been clocked at 40 mph under favorable road conditions.

Loop haulage is employed in the pit as much as possible. Inclines from the main road into the pit are limited to 6% if they are to be used by loaded trucks and to 12% if used by empties.

Haulage between pit and preparation plant is over company built roads, constructed to withstand the heavy pounding of the tractor trailers. First a base of rock and dirt or clay is spread in a strip that will yield a 50-ft road when completed. Next an 18- to 24-in cover of fireclay or rock is added to bring the road to subgrade. Then 4-in limestone is spread over the surface. This is sealed with No. 8 crushed limestone which is packed down by the truck traffic. More No. 8 limestone is added as needed to provide a smooth running surface for the trucks.

To keep the surface as smooth as possible, two Caterpillar motor graders constantly patrol the roads on the day shift. One of the units also works at night. Roads are sprinkled regularly to eliminate dust that would limit driver visibility and thus require slower truck speeds.

Power

Energy is delivered to the main substation near the preparation plant at 33,000 V. There a 5,000-kva General Electric substation steps the voltage down to 2,300 for delivery to the preparation plant. It is further reduced to 480 V at the preparation plant by two Westinghouse 1,500-kva substations. Power within the preparation plant is distributed through load centers.

Power for stripping equipment is transmitted 3 mi by poleline from the main substation to an Allis Chalmers 5,000-kva portable substation. This unit reduces voltage to 7,200 for powering the Marion 5760 70-yd shovel and overburden drills. Power is transmitted from the portable unit to a three-way disconnect house via a Type SHD cable. Distance from the substation to the switchhouse is limited to a maximum of 10,000 ft. And switchhouses are installed at 1,000-ft intervals along the highwall so that a minimum of cable is needed in the pit.

Power for the coal-loading shovel is reduced to 4,160-V by a 300-kva portable substation. And each of four Fairbanks-Morse pit pumps has its own Atkinson Armature Works substation that reduces voltage from 7,300 to 480. All pit units have General Electric FK143 oil-circuit breakers that provide over-current and ground-fault protection.

Preparing the Coal

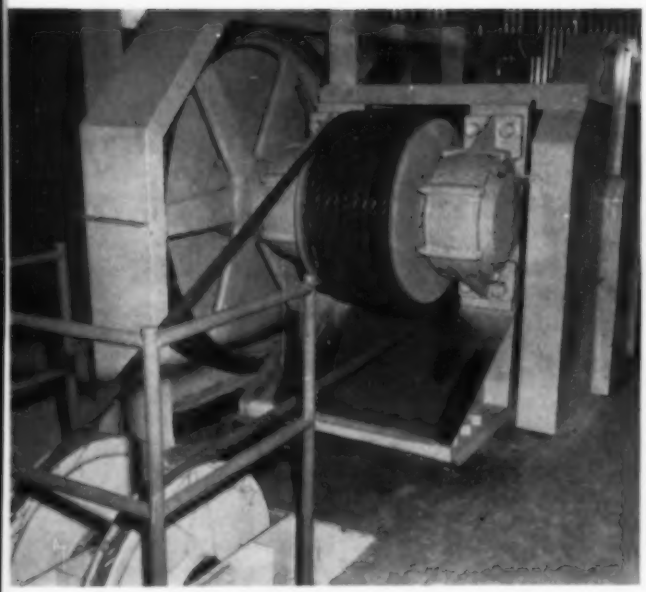
The River King preparation plant, sheathed in shining stainless steel, was designed to process 1,000 tph of raw coal. The company expects to eliminate the need for painting the exterior every third year by covering the plant with the 302 stainless steel.

Many of the plant units were salvaged from Peabody plants no longer in use. McNally Pittsburg Mfg. Co., designers and builders of the old plants, was called on to design the new River King plant and barge loading facilities. The new plant was designed with a minimum of flumes, chutes and conveyors. For example, the circulating water sump was located directly under the main dewatering screens, and the two-stage clean-coal crushers were placed immediately ahead of the dewatering screens and above the mixing conveyor. To eliminate the need for car droppers, and simplify loading of railroad cars, the company had McNally Pittsburg design a special car haul that permits one man to fill two 40-car strings simultaneously and without interrupting the flow of coal. Actual construction of the plant was done by Silas Campbell Construction Co., Harlan, Ky.

Coal haulers discharge raw coal into a 500-ton concrete hopper. When the hopper is full they stockpile coal adjacent to their normal discharge point. A Caterpillar D8 bulldozer pushes the coal into the hopper as the coal is drawn out. At the bottom of the hopper a 66-in reciprocating feeder delivers 1,000 tph of raw coal to a 60-in belt traveling 280 fpm. This and all other belt conveyors in the plant are equipped with Goodrich 6-ply 3/16 x 1/16 belting. The portion of the conveyor below the surface is covered by Armco multiplate tunnel arch.

After being elevated to the breaker building, the coal passes over a bar screen with 5-in openings. The overproduct discharges into a 12x27-ft McNally Pittsburg rotary breaker and is reduced to 5 in top size. Large refuse discharges into a bin from which it is loaded into a 15-ton Euclid truck and hauled to a disposal area.

The through products of the bar



TANDEM-DRUM HOIST pulls two 40-car trains of railroad cars on adjacent tracks, permits one man to handle car loading.

COUPLER CAR provides link between train of railroad cars and hoist rope. Cars are attached to both ends of rope.

screen and breaker combine and drop onto a 48-in belt conveyor for elevation to the top of the preparation plant. A diverting gate permits coal to be loaded directly on Tracks 3 or 4, or delivered to three McNally Norton 523 washers that make a separation into clean coal, middlings and refuse.

Clean coal flows over a stationary screen with ¼-in openings and then is split into two fractions. Approximately two-thirds goes to a pair of Allis Chalmers double deck Low Head vibrators making 5x1¼, 1¼x¼ and ½x0 products. The other third flows to a triple-deck vibrator and is separated into 5x3, 3x1¼, 1¼x¼ and ¼x0 fractions.

The 5x1¼, 5x3 and 3x1¼ are reduced to 1x0 in a two-stage Gundlach crusher capable of reducing coal down to ⅝ in top size. Facilities are included to permit the 5x3 to be bypassed and conveyed to a domestic storage bin.

The ¼x0 from all the clean-coal vibrators flows to the recirculating sump. From there it is picked up by a McNally 12x12 pump and delivered to a 50-ft settling cone. Concentrated solids from the bottom of the cone flow through a valve to a 16x60-ft drag tank. This unit discharges into dewatering elevator feeding three CMI centrifugal driers, that reduce surface moisture to 6%. Final drying is done in two Link-Belt Multi-Louvre thermal units.

Dried ¼x0 coal drops onto a flight conveyor and is mixed with 1¼x¼ which was heat dried in two McNally Vissac downdraft driers. Either 1x¼ or ¼x0 may be sent separately to two 1,400-ton storage bins or returned to the mixing conveyor for loading on Tracks 1, 2, 3, and 4. Motorized gates are employed at each loading track.

Middlings from all three washers flow to an American Ring crusher and are reduced to 1x0. They then are processed in a McNally Norton 4030 rewash box.

Clean middlings pass over a ¼-in stationary screen and drop onto an Allis Chalmers Low Head single-deck vibrator for separation into 1x¼ and ¼x0 fractions. The ¼x0 flows to the recirculating water sump and the 1x¼ is mixed with the crushed 5x1 from the primary washer and delivered to the mixing conveyor for loading into railroad cars.

Refuse from both the primary and secondary washers combine and flow to a refuse sump. Refuse is pumped to a 100-acre refuse pond through 600 ft of 10-in Armco spiral alloy pipe joined with Victaulic couplings. Part of the water in the pond is recirculated to the refuse sump and the overflow goes to the fresh water supply. With this setup no plant water will ever get into the outside stream drainage.

A special float valve at the refuse sump maintains a constant level in the sump, thus preventing it from running dry and causing trouble in the discharge line. When the water level drops, the valve opens and per-

Supervisory Personnel River King Mine

W. H. Price ... general superintendent
Robert Kelce ... assistant superintendent
Robert J. Harmon ... pit superintendent
W. L. Degan ... chief clerk
Thomas Price ... first shift pit foreman
Alfred Caskey ... second shift pit foreman
Harry R. Nesch ... assistant to superintendent
Howard E. Herzog ... drill foreman
Doris Lannier ... chief electrician
LeRoy Rohr ... shop foreman
Harold Haubrick ... storekeeper
Lee Deutschman ... assistant storekeeper
L. H. Cunningham ... resident engineer
Parvin Day ... field engineer
John Fuller ... draftsman
Edward Baeher ... rodman
Walter Lehr ... rodman
Marlin Albert ... rodman
Hubert Fox ... first shift tipple foreman
John Heartherly ... second shift tipple foreman
B. P. McSherry ... chemist
James Gill ... sampler

FOUR GENERATIONS of the Kelce family: Russell, 4; Robert D., 29, assistant superintendent, River King; Ted L., 56, Peabody vice president, and David Kelce, 89.

units more recirculated water to enter the sump. In the near future the company expects to have a dual refuse pump and discharge line in service. The second line will have a uniform upward slope from the pump to the pond so that draining and flushing will be simplified. Thus the danger of freezing or clogging will be minimized. And the possibility of a plant shutdown from these will be virtually eliminated.

Coal moves to markets three ways —by trucks to nearby users and by rail or river barges to more distant markets. The company-owned railroad connects to the Terminal R. R. of St. Louis which is a trunk line serving railroads coming into the St. Louis area. With this link the company can serve markets either by rail or water.

Peabody's retail setup is independent of the rail operation. It includes the 5x3 egg hopper plus the two 1,400-ton steel bins. Two Toledo scales are used to speed movement of trucks, one weighs empties and the other weighs loads. Each of the 1,400-ton bins has a 36-in belt feeder that can deliver coal at the rate of 250 tph to a 30-in truck-loading belt. The domestic egg bin has a motorized gate.

Railroad car loading is handled by one man who operates two special car hauls built by McNally Pittsburg. Gravity is not used at any time at the preparation plant or at the river dock. Each car haul consists of two coupler cars which are connected by 3,000 ft of 1¾-in wire rope. The rope runs between the rails of two tracks so that 40 cars being loaded travel in one direction and 40 empties travel in the opposite direction to get in position for loading. For example, if 40 cars are being loaded on Track 1, a string of 40 cars on Track 2 is being pulled back. As soon as the last car on Track 1 is loaded, the motorized gate is closed and the gate over Track 2 is opened to start loading the first car of the new 40-car train. Loading on Tracks 3 and 4 is handled similarly.

The speeds of the car hauls are controlled by a 5-speed magnetic controller located in the operator's tower. Speeds may be varied from 3 to 24 fpm. Each car haul consists of a General Electric Kinamatic 100-hp DC motor transmitting power to tandem rope drums through a Falk 9D111 gear drive. Speed control is regulated by a General Electric speed variator control.

There are four 1,500-ft storage tracks at the preparation plant and work is under way to add two more 1,500-ft tracks plus 1,500 ft to the present runaround. These new additions will increase the storage capacity and provide room for switching.

Quality Control

Clean coal is continually sampled at River King and sent to the company's laboratory at Seminole mine. But a new laboratory now is under construction at River King. When it is completed, it will serve as a central laboratory for Illinois operations and to supplement the facilities at each of the mines. It will be designed to handle more detailed analysis than the local laboratories.

Barge Loading

Clean coal is pulled to the river dock in 35-car trains by two 1,000-hp General Motors diesel units. The company also has a 1,400-hp Alco unit that usually handles cars marked for rail shipment. Cars are stored at the dock on any one of four tracks.

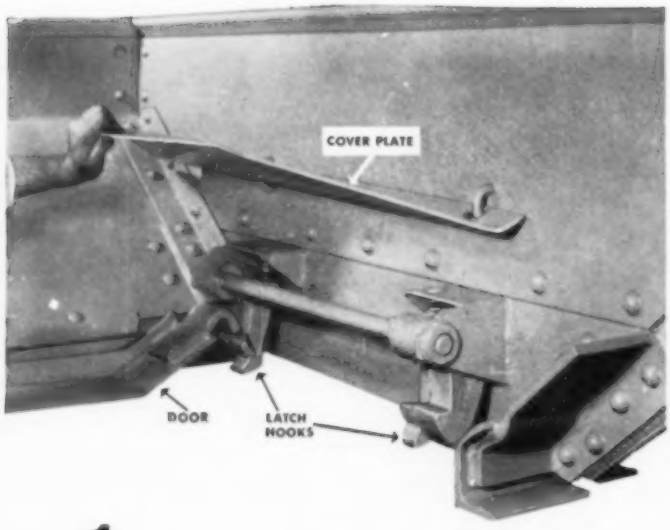
At the dock, cars are moved by a single car haul similar to the units at the preparation plant. The dock haul is powered by a 200-hp motor and has a 2-in wire rope. Cars from any of the four tracks may be pulled across a 250-ton hopper at speeds ranging from 25 to 50 fpm.

When a car stops over the hopper, a Hewitt-Robins car shakeout speeds unloading. Two 48-in McNally Pittsburg reciprocating feeders under the hopper deliver coal to a 48-in belt that carries it 360 ft to waiting barges. Traveling 650 fpm, the belt carries 1,500 tph of coal. As the coal flows to the barge it passes over a Merrick Weightometer, then over a hinged boom to a revolving loading chute that spreads coal evenly in the barge as it moves by.

To make possible loading at various river states, the dock was designed with a 42-ft range in loading height. The main section of the belt conveyor is 1 ft above the all-time high water mark of the 1844 flood.

The dock itself has 14 cells, made up of 16- and 20-ft units. Cells are steel sheet piling backfilled with crushed limestone and have a concrete diaphragm at midsection. They are capped with concrete.

Three men perform all car movement and barge loading at the dock. Two men unload railroad cars and one man operates the dock. A small switching boat is manned by two dock hands. This unit makes up tows and also delivers coal to a power plant 20 mi away.



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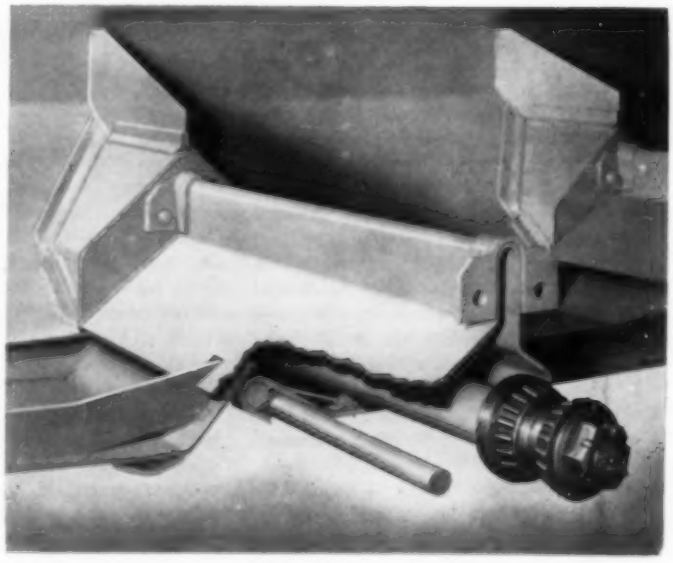

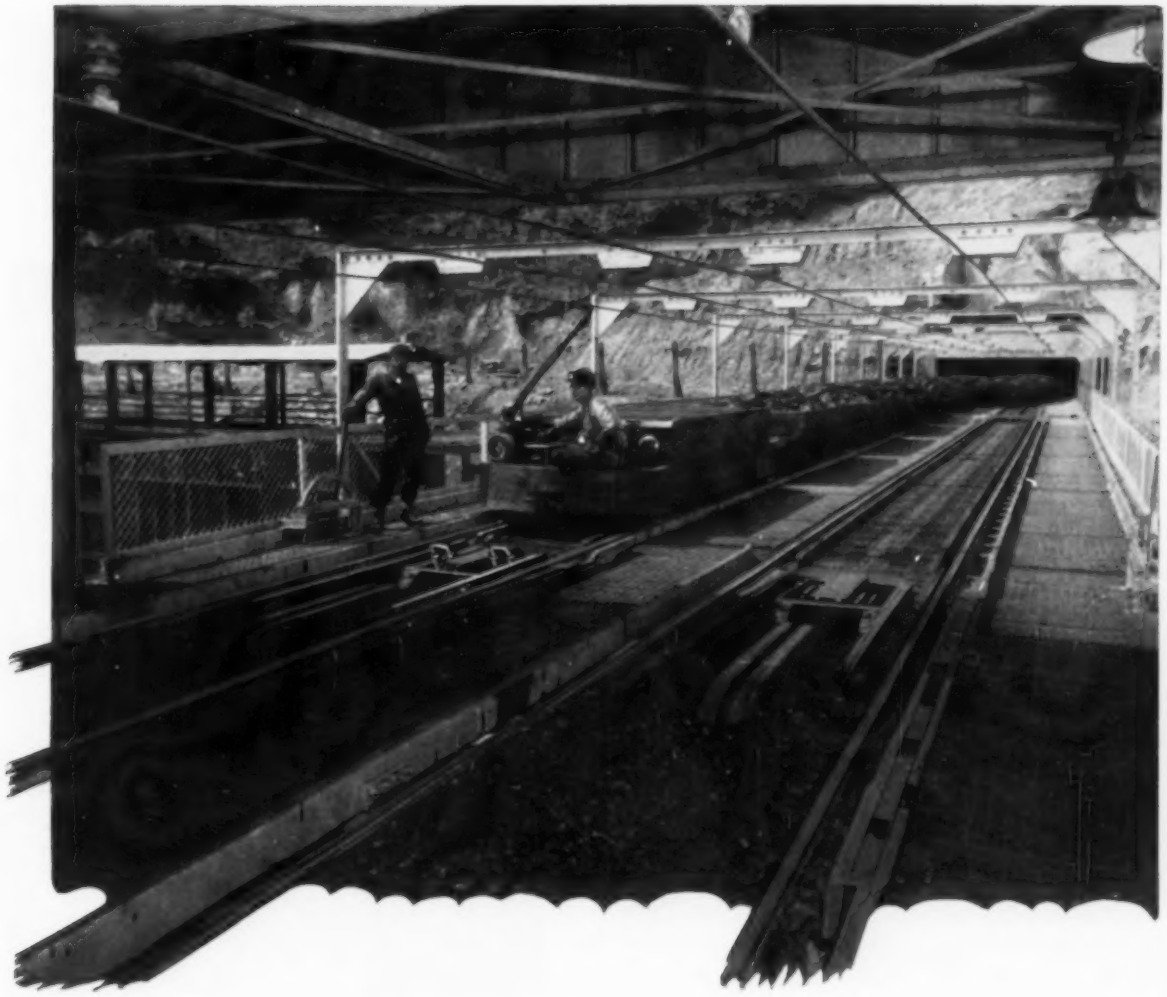

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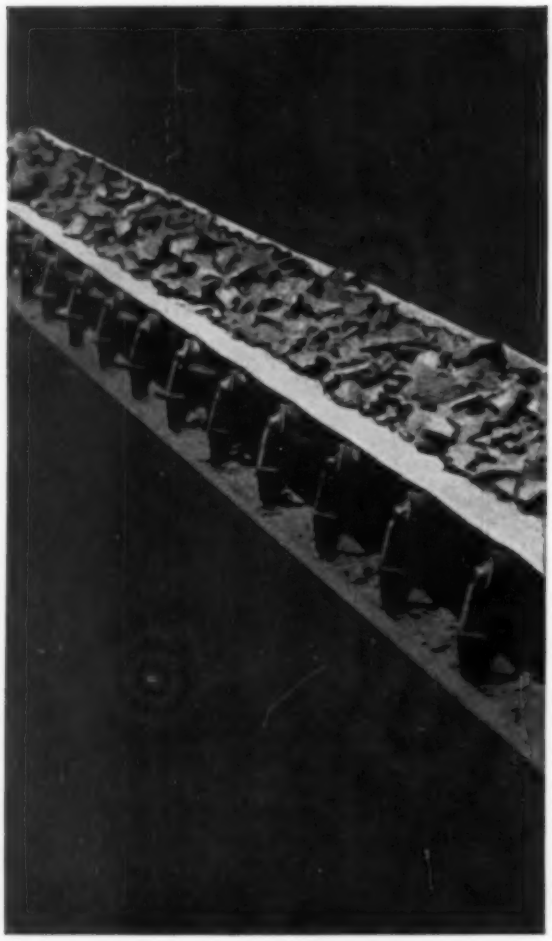

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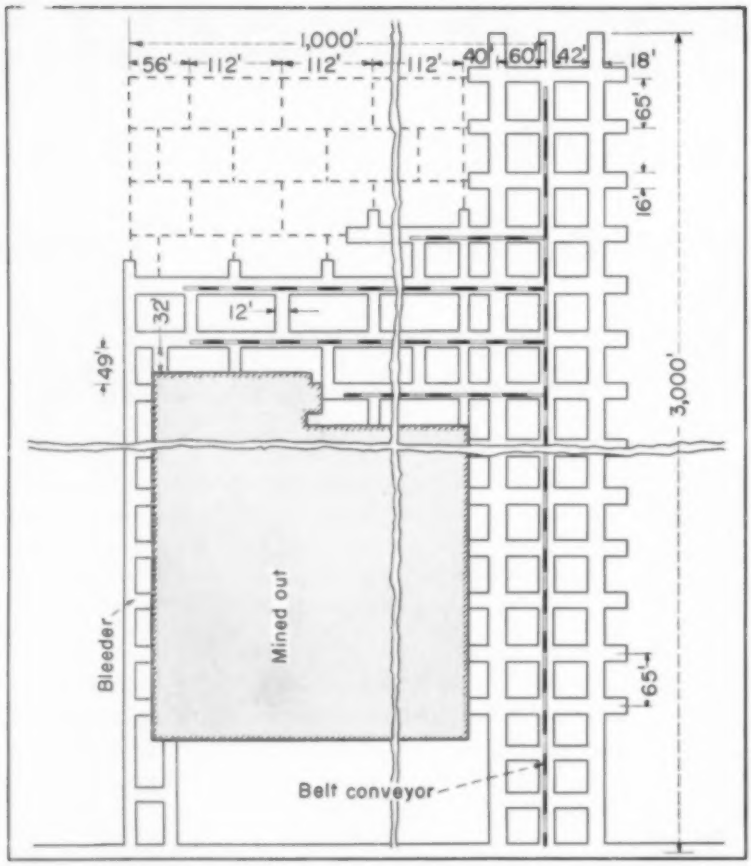
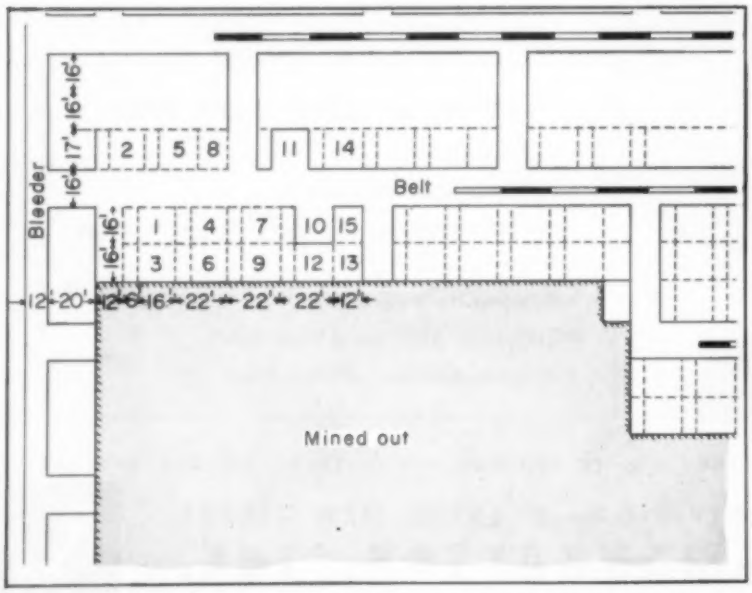


HIGH SPLINT continuous-miner development plan includes sections 2,000 ft wide and 3,000 ft deep mined with 1,000-ft-deep rooms on one side on the advance and on the other side on the retreat.



ALTERNATE RIGHT-AND-LEFT PILLAR EXTRACTION PLAN is used in the High-Splint seam, with pockets driven in the order shown to complete recovery.

Pillar Extraction With Continuous Miners

How systems were designed for three types of miners selected to meet specific seam conditions at the Lynch operations of U. S. Steel. Pillar plans include an angle system for boring-type miner and alternate right-and-left plan for ripper unit.

By E. D. Slone
District Mining Engineer, Lynch Dist., United States Steel Corp.

BOTH CONTINUOUS and conventional mining equipment is used in the Lynch Dist. of the United States Steel Corp. This district is in Harlan County, southeastern Kentucky, and is one of three operating districts of the coal division of the corporation. The output is a high-volatile metallurgical coal for coking purposes. There are two deep mines and a stripping operation as well as associated facilities required for the safe and efficient extraction of a high-quality marketable product.

The coal mined at Lynch is transported by rail to Corbin, Ky., approximately 90 mi away, where it is processed in one of the most modern

Abstract of a paper presented at the 1957 meeting of the Kentucky Mining Institute.

preparation plant in the United States. The product, leaving the preparation plant at approximately 3.5% ash and 4.5% moisture, is transported to Gary, Ind., where it is converted into coke in by-product ovens.

Conventional sections at Lynch are provided with the normal complement of cutters, loaders, shuttle cars and other equipment standard to that type of mining. In addition three types of continuous miners are in operation: the Joy 1 JCM, Jeffrey 76 AM and Lee-Norse CM 33X. Each was selected on the basis of matching the characteristics of the machine to the conditions in the area to be mined.

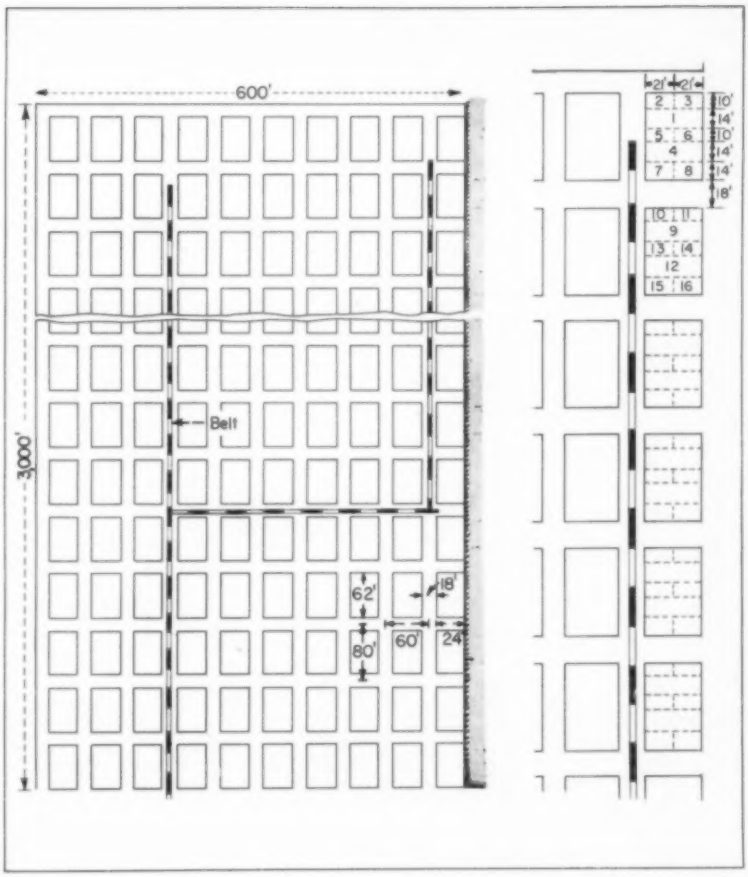
Three seams are being mined at present in the Lynch Dist. The "B," or Marker, seam and the "C," or Taggart, seam provide the output of No. 31 mine. No. 32 mine works the High Splint, or Hindman, seam. These seams range in thickness from an average low of 40 in in the "B" seam to an average high of 66 in in the High Splint. The extremes range from 26 in in the "B" seam to 8 ft in some areas of the High Splint. Sandstone rolls and "want areas" are present in all three seams. However, they are most prevalent in the High Splint.

Roof varies in each seam between drawslate, shale and sandstone. Roof-bolting predominates for primary roof control in all development sections. However, roof-bolting is supplemented by timbering as an additional safety measure during retreat work. Maximum cover ranges from 2,000 ft over the "B" seam to 800 ft over the High Splint. All seams outcrop.

High-Splint Mining

There are four Joy 1-CM continuous miners operating in the High Splint seam at No. 32 mine, which is a three-shift continuous operation. Three of the machines are assigned to a producing section. Maintenance schedules require each miner to be idle one shift each day for sectional maintenance, which results in six operating miner shifts daily. The fourth machine is normally used to rotate the other three through the shop for a regularly scheduled overhaul. This machine is also utilized to open new sections during periods when it is not required for rotation.

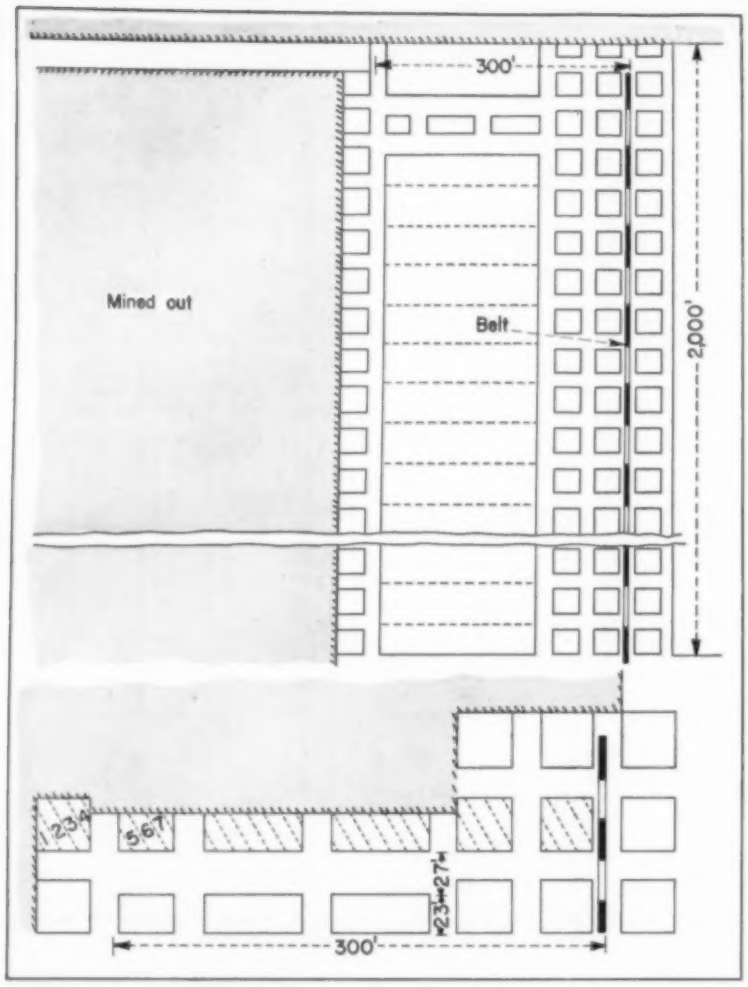
Initial mining plans for the development of a section 2,000 ft wide and 3,000 ft deep were based on driving three headings 18 ft wide on 60-ft centers. Rooms were turned to the left at an angle of 90 deg on 65-ft centers. These rooms were driven 16 ft wide to an approximate depth of 1,000 ft. Ninety-degree breaks were driven 12 ft wide and staggered on 112-ft centers. The rooms were driven and pillared, and the headings developed, by three Joy continuous miners equipped with extensible belts and bridge conveyors. Mining plans were flexible enough to permit the three miners to develop and pillar rooms, and advance the pilot headings.



PILLAR EXTRACTION with ripper-type continuous miners in section developed for conventional equipment, High Splint seam.

Room development left blocks of coal approximately 49 ft wide and 100 ft long. In recovering these blocks on retreat, about two-thirds of a block was mined from the right and one-third from the left. As an example, the block between Nos. 2 and 3 rooms would be recovered by mining one-third from No. 2 room and two-thirds from No. 3. The 100-ft blocks were mined by the pocket-and-wing method. A sequence map was prepared for the section indicating the order in which the cuts were to be taken. Assistant mine foremen were familiarized with the sequence map and the importance of adhering to the sequence was emphasized before mining operations were started. Many of the problems encountered in such a mining operation were resolved in the preparation and explanation of these maps.

In extracting room blocks, the first pass is made to the left by driving a 16-ft-wide pocket 16 ft deep toward the gob, leaving a 6-ft-wide protective wing. This pocket is roof-bolted while the miner is making a similar pocket to the right 17 ft deep and extracting the wing in that pocket. The miner then returns to the left side, drives the pocket to



DEVELOPMENT AND PILLAR-EXTRACTION PLANS for boring-type miner in the "B" seam averaging 40 in in thickness.

the gob and extracts the wing as it pulls out. This process is repeated until the room is completely pillared. This method of mining results in about 90% recovery of the coal and we have experienced good pillar falls.

Pillar extraction with a continuous miner compares favorably with a conventional pillaring section and requires only about half the manpower.

The dust problem was minimized by adequate ventilation, maintaining sufficient water on the machine and the use of an open inby room to the bleeder.

Pillaring Conventional Sections

Conventional sections at No. 32 mine are normally 600 ft wide and 3,000 ft deep. These sections are developed by driving 18-ft-wide headings on 75- or 60-ft centers. Breakthroughs are driven 18 ft wide on 80-ft centers at an angle of 90 deg. The 60-ft center entry development leaves blocks of coal 62 ft long and 42 ft wide to be pillared. This size block lends itself well to continuous-miner extraction. Such a section, which had just been developed by conventional equipment was chosen for pillaring with the fourth continuous miner.

A cross belt was installed from the mother belt to the extreme right entry 12 blocks back from the end of the section. An extensible belt was installed up this right-hand entry to the last block. This setup would permit the miner to extract 11 blocks as it retreated down the entry.

The blocks are mined by the pocket-and-wing system. A 14-ft-wide pocket is mined to the left 42 ft to the gob leaving a 10-ft-wide wing. No pockets are driven to the right. When the pocket is driven through, the wing is extracted. This process is repeated until all 11 blocks are extracted. The miner and extensible belt are then moved to the next entry and the process is repeated. When the section is retreated to the cross belt it is moved 12 breaks back from the pillar line and the process is repeated. This unit operates three shifts daily with sectional maintenance scheduled at the start of each shift.

"B"-Seam Mining

No. 31 mine has two Jeffrey 76 AM continuous miners in operation in the "B" seam. One miner is engaged in driving rooms where pillars are not extracted. The other miner is driving rooms and extracting pillars. Cleanup loaders with shuttle cars, or bridge and chain conveyors, are used behind the Colmols depending on the conditions encountered.

The Colmols operate three shifts each daily and sectional maintenance is performed at the start of each shift. A conventional section is used to replace the Colmol during scheduled shop overhaul.

Mining plans for a Colmol pillar section include driving four headings 18 ft wide on 50-ft centers to a depth of 2,000 ft. Crosscuts are turned 18 ft wide on 50-ft centers at an angle of 90 deg. When the headings are driven up, rooms 27 ft wide are driven to the left to a depth of 300 ft from the belt heading. Right-angle room breaks 18 ft wide are turned on 80-ft centers.

The first two rooms are driven abreast to maintain ventilation. This development leaves blocks of coal 23 ft wide and 62 ft long for pillar extraction. In recovering these blocks on retreat, the pillars on the right side of the room are extracted by taking passes with the Colmol approximately 9 ft wide on an angle of 60 deg through the pillar to the gob.

Sequence maps were prepared for the section and explained to the assistant mine foremen. The mining sequence incorporates driving a room and extracting the room pillar of the next inby room. This open room provides an escapeway and additional

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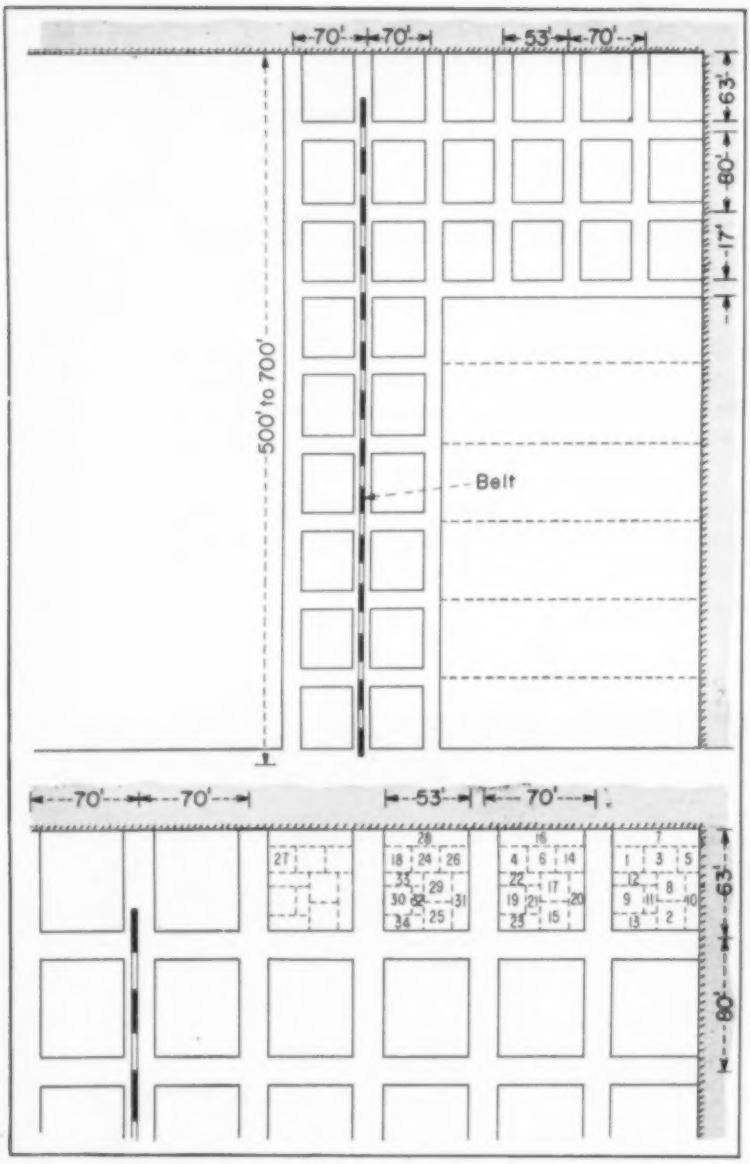

"C" SEAM DEVELOPMENT for continuous mining showing entry and room advancement and sequence recovery of the pillars with semi-rigid equipment.

shuttle-car roadway. Approximately 19 passes are required by the Colmol to extract a room pillar. When two room pillars are extracted, two rows or four chain pillars are extracted in a similar manner. A row of chain pillars is left on the right side of the section to form a bleeder for the next section. This process is repeated until the section is mined out.

In room development, both roof bolts and wood timbers are installed for roof support. Additional support is provided by wood timbers in extracting the pillars in final recovery.

Pillar extraction with a Colmol, as with other continuous miners, has proven satisfactory when compared to pillar extraction with conventional units. With the Colmol, as with other equipment, the dust problem is minimized by adequate ventilation, sufficient water on the miner and the use of bleeder entries.

"C"-Seam Mining

Two Lee-Norse Model 33X continuous miners are in operation in the "C" seam in No. 31 mine. A third Lee-Norse unit is maintained to rotate the two operating units during periods of scheduled maintenance. This third unit will also be utilized as an operational spare for the mine.

The two operating miners are recovering barrier pillars in the "C" seam. These are 500 to 700 ft wide on each side of the haulage headings. Shuttle cars are used with each miner to carry the coal from the face to a conveyor belt.

Mining plans for a Lee-Norse section are based on driving three headings 17 ft wide on 70-ft centers through the barrier pillar. Breakthroughs 17 ft wide are driven on 80-ft centers at right angles. When the entries are driven up, three rooms are turned to the right and driven 17 ft wide on 80-ft centers. Room breaks are 17 ft wide on 70-ft centers. This development leaves blocks of coal 53 ft wide and 63 ft long. These are extracted by a pocket-block being mined from two sides.

Sequence maps were prepared for the section and the assistant mine foremen were familiarized with the system.

In extracting a block, a pocket 17 ft wide is mined to a depth of 17 ft deep leaving a wing 10 ft wide. This pass is bolted while the second pass is being mined. The second pass is made from the room side of the block and is driven 17 ft wide to a depth of 17 ft leaving a 10-ft-wide wing.

Three passes are made across the back of a block, two up the side and the back wing is extracted. This leaves a 27x36-ft block and a wing. A 17-ft-wide pocket is driven across the back side of this block and the side wing is extracted. Then the pocket along the back side is driven through and the wing extracted. This leaves a 9-ft-deep 26-ft-wide push block which is extracted as the last pass.

This process is repeated until a row of blocks has been extracted. When it becomes necessary for the miner to wait on bolting, the next outby block is started. An open room is maintained to outby the pillar line for an escapeway and as an additional shuttle-car roadway. When the first two rooms of blocks have been extracted, two more rooms must be advanced in order to maintain the outby open room.

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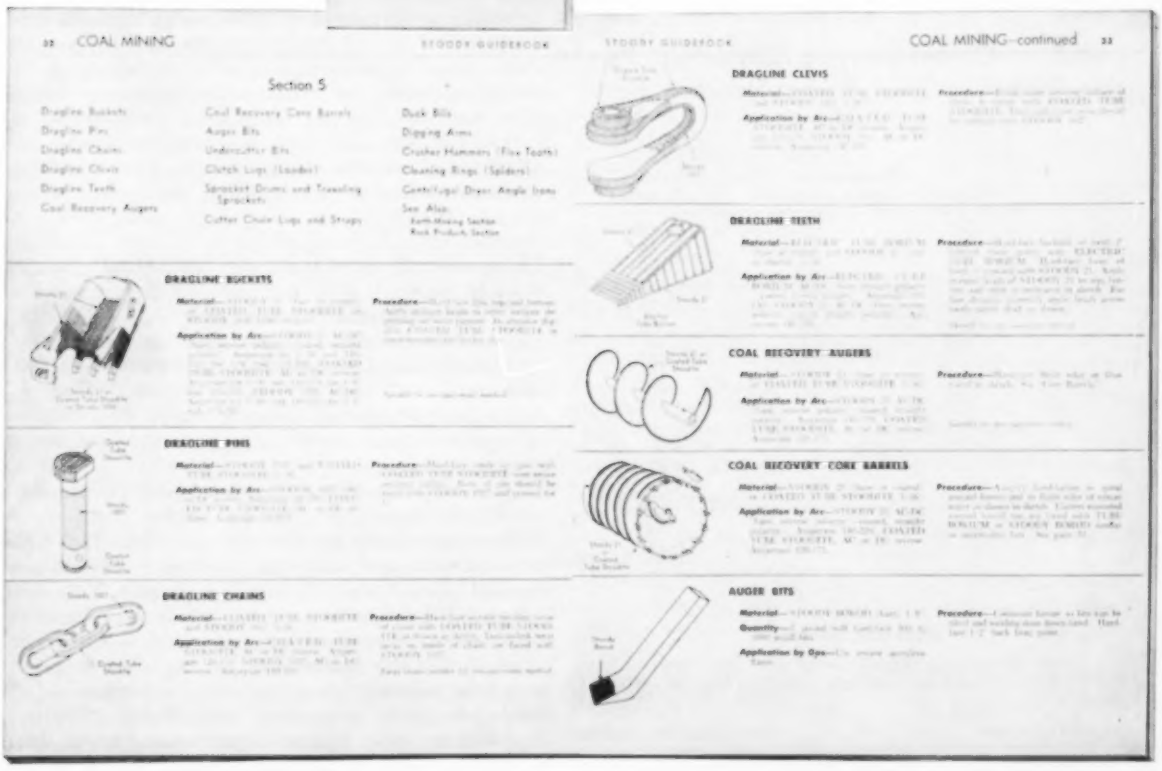

STOODY COMPANY
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Current-Carrying Capacity,

A report verifying 1940 recommendations for maximum current and other factors affecting cable life and suggesting a practical method for rating cables on reels, including differences, if any, in the heating effect of AC and DC

By John J. McNiff and A. H. Shepherd
Simplex Wire & Cable Co., Cambridge, Mass.

TRAILING CABLES were essential components of the equipment installed at the first completely mechanized coal mine, at Ayrshire, Ind., which opened in 1922. Such cables were used then and are still used because safety considerations prohibit installation of permanent electrical wiring in dangerous sections of mines. They also give range and mobility to the equipment.

Mine conditions expose cables to relatively severe mechanical abuse, chemical attack and electrical overloads, yet they must be reliable. To apply them properly, mine operators and equipment manufacturers need to know how much power trailing cables can carry under normal operating conditions and how much mechanical abuse they can withstand. The size of the cable has a very pronounced effect upon the range and reliability of the equipment. Cables that are too large fill the reel with fewer linear feet and limit the range of the equipment, while cables that are too small get overheated and fail sooner under normal usage.

Federal and state agencies, and equipment and cable manufacturers have given considerable time to the study of trailing cables. These studies have brought about cable improvements and furnished information to operators on cable limitations and capabilities.

Bureau of Mines Bulletin 358 ("Rubber Sheathed Trailing Cables," L. C. Isley, A. B. Hooker and E. J. Coggeshall) is a comprehensive report of the department's work to September, 1931. It describes trailing cables that were then used and told how their design affected performance. It also reports the bureau's surveys of service conditions in mines and its laboratory investigations into the hazards of use, such as, crushing, overheating, tearing and abrasion of cable sheaths, breaking of conductor strands, reeling and kinking. Finally it establishes methods and standards of splicing cables and publishes a list of cables recommended for use in mines.

Cable manufacturers since 1940 have published a number of individual and industry specifications for portable cables. Some of these include tables indicating, under specific conditions, the recommended maximum current cables may carry. In one specification ("General Specifications for Wire and Cable with Rubber, Rubber-like and Thermoplastic Insulations," January, 1946 and "Special Constructions," February, 1951) the current ratings take the form of:

1. A table of current-carrying capacity of portable cables in air.
2. Maximum conductor temperature.
3. A table of correction factors to adjust current-carrying capacities for deviations from standard ambient temperatures.
4. A table of derating factors to reduce current-carrying capacities according to the number of layers wound on a reel.

These recommendations can be found in manufacturers' publications ("The Simplex Manual,") as early as 1940, and in industry specifications since 1946. They have remained unchanged except for extension to include new sizes and types of cable. These ratings are given in Table I.

It is well known that overheating is a prime cause of cable failure. Some years ago the cable industry and others studied this heating problem. As a result of this study, the industry has agreed on a maximum recommended conductor temperature rating of 60C (140F) for mine trailing cables. This temperature rating is still valid for modern cables if maximum service life is to be realized.

TABLE I—Current-Carrying Capacities, Portable Rubber-Insulated Rubber-Sheathed Power Cable

AWG	1-Cond	2-Cond Concentric, Amp per Conductor	2-Cond Twin or Round
8	45	...	40
6	60	50	50
4	85	65	70
3	95	75	80
2	110	90	95
1	130	100	110
1/0	150	120	130
2/0	175	135	150
3/0	205	160	175
4/0	235	180	200

This table assumes a maximum conductor temperature of 140F (60C) and a maximum ambient temperature of 104F (40C). Correction factors for other ambient temperatures are as follows:

Ambient Temperature		Correction Factor
10C	50F	1.58
20	68	1.41
30	86	1.22
40	104	1.00
50	122	0.71

Derating Factors

When the cables are used with one or more layers wound on a gathering reel, the current-carrying capacities shall be corrected as follows:

Number Layers	% of Specified Values
1	0.85
2	0.65
3	0.45
4	0.35

Abstract of a paper presented at the 1957 fall meeting of the American Institute of Electrical Engineers.

Portable Power Cables on Reels

Portable Cables on Reels

A number of mining machines use portable cables which are automatically spooled. Before the cable is gathered on the reel, it generally lies on the ground with space between it and other cables. It is surrounded by air at base ambient temperature. On the reel, it is tightly packed with many turns, all carrying current and in an enclosed space with little air circulation between turns or layers.

As a result of this restriction of heat flow a cable will get much hotter on a reel for a given current than it will in the open. The current it may carry without exceeding safe conductor temperature decreases. Since more layers add to the heat source, they further decrease the permissible current.

The derating factors given in Table I have been considered necessary for safe operation of portable cables.

Testing Cables on Reels

This paper reports a verification of the recommendations and suggests a practical method for rating cables used on reels. The experimental work and calculations were confined to a single popular size and style of trailing cable on a representative reel for use on mine shuttle cars with the following objectives:

1. Determine what values of current would raise the hottest-spot conductor temperature to 60C (140F) with from one to five layers on a reel and in free air.

2. Compare these values with the values calculated from Table I.

3. See if there is any difference between the effective heating of a cyclically varying load, like the load demand of a shuttle car, and the heating by a steady current of equal RMS value.

4. See if there is any appreciable difference between alternating and direct currents of equal RMS values in the heating of a two-conductor cable on a reel.

The cable used is a standard two-conductor, No. 4 AWG, 133-strand, Type G, twin shuttle-car cable, 600 V, with a No. 7 AWG ground wire, as illustrated in Fig. 1.

A standard shuttle car reel was used. Reel dimensions are 23¾ in head diameter, 10⅛ in drum diameter and 12⅝ in traverse between the heads. Its rated capacity is 390 ft. It is all-steel except the flange insulator, which is ¼-in Masonite die stock. A third of the reel drum is an open structure which permits air to enter through holes in the head behind the mounting flange. The space within the solid section of the drum forms a permissible enclosure and protects the slip rings and bearings located within. The entire drum is covered with two layers of friction tape and two layers of varnished cambric tape, half-lapped and coated with insulating paint.

When mounted on the shuttle car, this reel is somewhat enclosed by the sides and fenders.

Temperature Measurements

Conductor temperatures were measured with copper-constantan thermocouples and a potentiometer. Five thermocouples were spaced along the cable so that when five layers of cable were wound on the reel, they assumed the positions shown in Fig. 1. A sixth thermocouple was supported from one flange of the reel approximately 6 in above the wound layers of cable. Each of the thermocouples tied to the cable was inserted into one conductor through a flap cut in the jacket and insulation.

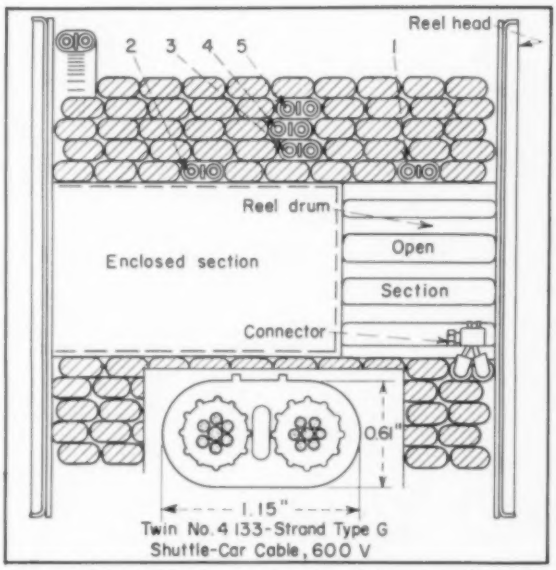

FIG. 1—TEST REEL showing location of thermocouples in the layers. Inset shows design of the twin No. 4 shuttle-cable used in the tests.

TABLE II—Schedule of Loads Applied to Layers of Cable on Reel, in Air.

Layers of Cable on Reel	Load Current (% of Rated Current in Air)
1	75, 85, 95
2	50, 55, 60
3	40, 45, 50
4	30, 35, 40
5	30, 35, 40

The Bureau of Mines Bulletin 358 had established that:

1. Maximum temperatures would be reached.

   A. In the center turn of each layer, and

   B. In the center layer between the reel drum and the outermost layer.

2. There is no appreciable difference in temperature in any one turn from top to bottom or from side to side of the turn.

Current Load Tests

DC Loads—The schedule of DC loads shown in Table II was applied to the cable. Each value of load was held until every temperature had reached steady state. The current flowed through one conductor to a junction at the drum of the reel and returned through the other con-

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ductor. As set up, the ground wire did not carry current.

AC Steady Loads—In theory, an alternating current should have the same heating effect in a No. 4 AWG conductor as a direct current of the same RMS value. Also, the leakage flux from a twin cable should be so small that inductive heating of the steel reel is imperceptible. Nevertheless a winding of 55 turns of twin cable on a steel reel might have some unexpected effects. Therefore, a series of heating runs was made with alternating currents to parallel roughly the heat runs with DC outlined in Table II.

AC Cyclically Varying Loads—In practice, shuttle-car cables carry loads which vary in cycles. They go through a cycle of six operations with each operation calling for a different level of power. At the same time the trailing cable is spooled on the reel as the car trams back and forth.

The six operations in a normal cycle are:

1. Jog conveyor to distribute incoming load of coal.
2. Tram load from face to the main haulage line.
3. Idle waiting for a space or a car at the main haulage line.
4. Discharge load.
5. Tram empty back to mine face.
6. Idle waiting for space at loading conveyor.

A typical cycle of operations is represented by the load current chart shown in Fig. 2. This chart is one of twelve consecutive cycles recorded during regular operations. In this case, the fixed power outlet was located near the main haulway so that the cable reel was almost empty while the car was being loaded and was full while the car discharged its load.

In the laboratory test, it would have been impracticable to empty and fill the reel while the load varied through its cycle. For this reason the reel was left loaded with five full layers of cable.

Two steps of calculations were used to convert the load chart (Fig. 2) to a usable schedule of cyclically varying current with the same heating effect. First, the RMS value of current and the duration of each operation in twelve consecutive cycles were determined graphically from the load chart and averages were taken for each operation. The results are shown in Table III.

Second, calculations corrected approximately for the number of layers on the reel during actual operation. This was done to determine the current under test conditions, five layers, which would produce the same hot-spot temperature produced for each operating condition in Table III, assuming that the particular operation was continued indefinitely.

The full reel as shown in Table III was assumed to have five layers, and the empty reel the major part of one layer, presuming a mine operator would not risk tramming a car to the end of its cable. The average number of layers on a reel during tramming from full to empty would be three.

It was also necessary to change the total duration of the cycle from 4 min 2 sec to an even 5 min because that was the fixed period of a six-element programming switch which was available. The duration of each step was expanded by one-fourth and each result was rounded off to the nearest 5 sec. The modified cycle of currents and times is shown in Table IV.

The RMS value of the load cycle in Table IV is 19.4 amp. This is only about 20% of rated current of the cable at the ambient temperature in the laboratory. Therefore, a series of heat runs was made with the individual current values shown in Table IV increased successively to 1.25, 1.50, 1.75 and 2.0 times the values of Table IV, and the ultimate conductor temperatures were recorded.

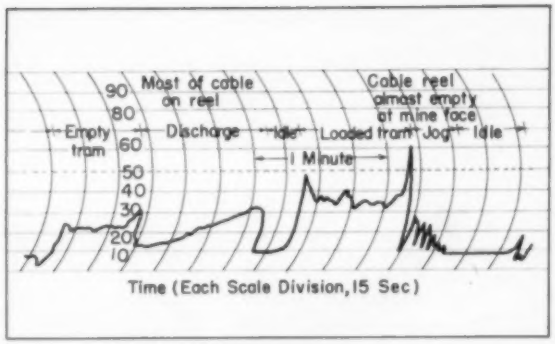

FIG. 2—TYPICAL LOAD-CYCLE CHART for shuttle-car service. Read from right to left.

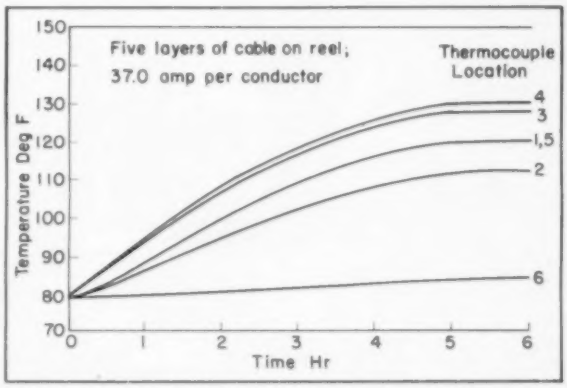

FIG. 3—TYPICAL TEST RUN, temperature v. time, steady DC load on the cable, five layers on the reel.

TABLE III—Typical Shuttle-Car Operating Cycle

Operation	Cable Reel	Effective Current, Amp	Duration, Sec.
Jog conveyor	Empty	20.4	25.2
Tram loaded	Empty to full	35.6	55.2
Idle	Full	8.75	7.8
Discharge load	Full	22.1	61.2
Tram empty	Full to empty	23.4	58.4
Idle	Empty	8.5	34.2
Total			242.0

TABLE IV—Test Cycle of Currents Equivalent to Shuttle-Car Operating Cycle

Operation	Cable Reel	Effective Current, Amp	Duration, Sec.
Jog conveyor	5 layers	9.0	30
Tram loaded	5 layers	26.9	75
Idle	5 layers	8.75	10
Discharge load	5 layers	22.1	75
Tram empty	5 layers	17.3	65
Idle	5 layers	3.8	45

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This low and compact switch stand is Bethlehem's Model 1222. Here, it presides over a turnout built from 85-lb rail, and in the course of a day's work at this busy mine it really earns its keep.

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Model 1222 has only three moving parts: the lever, the crank and the sliding block. None of these parts is located beneath the base of the stand; thus the mechanism stands clear of ballast and roadbed.

You can use this stand in connection with a standard rigid rod, or with Bethlehem's No. 11 SFU spring rod as shown above. It can be furnished with special crank to carry standard target lamp or target only. You can get any additional details about Model 1222 by writing to us at Bethlehem, Pa., or by calling the Bethlehem office nearest you.

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Test Results

As indicated earlier, predetermined loads were applied to the cable in accordance with Table II. Since ambient temperature could not be controlled—in fact it tended to rise during the test—the percentage varied from its intended value.

Fig. 3 is a typical test run of temperature vs time for steady DC loading. A study of all the curves of this type has shown:

1. The conductor temperature of the cable adjacent to the solid portion of the reel drum is almost the same as that of the outermost layer of cable when there are three or more layers of cable on the reel.
2. The conductor temperature of the cable adjacent to the open section of the reel drum is nearly the same as that of the second next to outermost layer with three or more layers of cable on the reel.
3. Ultimate temperatures are reached in 3 to 5 hr depending on the number of layers of cable on the reel.
4. The hot spot invariably occurs in the middle layer of cable.

Fig. 4 is a plot of the hottest ultimate steady-state temperature recorded for each test (the hot-spot temperature) as a function of the corrected percentage of current-carrying capacity.

Using the duty cycle of Table IV, the effect of cyclic loading was determined. Results of tests with reels both covered and uncovered, compared with results of steady DC tests, are given in Fig. 5.

With the reels uncovered, the cable tends to run a few degrees hotter with cyclic loads, though the difference is small. When the reels are covered, the temperature rises sharply for a given load. During normal mining operations the effect of the covering may be compensated for by the movement of the cable and shuttle car through the air. When steady-state temperatures were reached with reels covered or uncovered, none of the temperatures varied more than 1F during a cycle.

Fig. 6 is a summary of the test results. In it the percentages of current-carrying capacity at which the curves of Fig. 4 cross the 140F (60C) ordinate are plotted against the number of layers on the reel and are further compared with present derating factors.

Conclusions

The test results agree with the derating factors commonly used within 10% except for the case of two layers on a reel which differs by about 20%

During service, a shuttle-car cable will normally operate with four or more layers on the reel for a large part of the time, especially while drawing its heaviest load. Since all results indicate that the accepted rating factor of 35% is correct for four or more layers on a reel, it would be realistic to restrict current-carrying capacity of cables in shuttle car service to 35% of that of similar cables in air.

The type of loading has no significant effect. This is true of comparisons between:

1. Alternating and direct currents having the same RMS value, and
2. Cyclic loading similar to that occurring in service and steady state loading with the same overall RMS current.

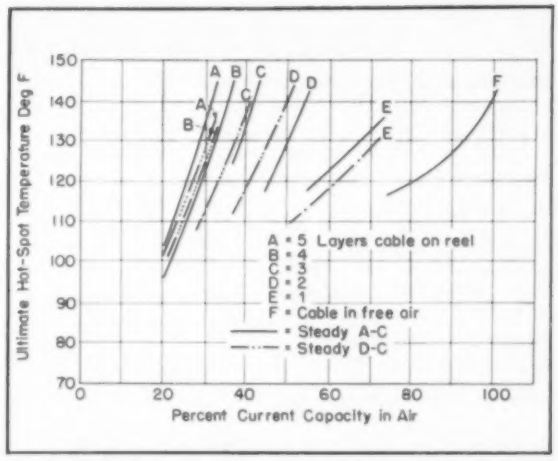

FIG. 4—ULTIMATE HOT-SPOT TEMPERATURE in relation to percent of current-carrying capacity.

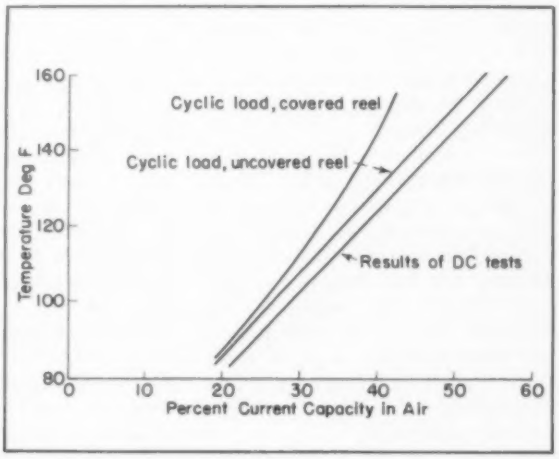

FIG. 5—CYCLIC-LOADING EFFECT v. steady DC loading.

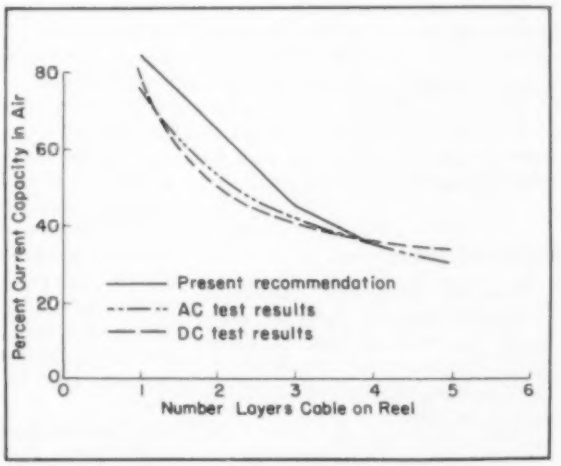

FIG. 6—COMPARISON of derating factors from tests.

INCENTIVES—Benefits, Establishment, Pitfalls

Advantages to the Company
1. Increased production.
2. Better management through better supervisors.
3. Better satisfied supervisors through recognition.

Advantages to the Foreman
1. Elevation of his ability through his own efforts.
2. Formal recognition of individual performance for promotional purposes.
3. Monetary recognition for a job well done.
4. An answer to the question: "How am I doing in my work?"

Setting up an Incentive Plan
1. Standards must be developed.
2. Provision must be made for equitable application.
3. Positions participating must be selected.
4. The how of participation must be determined.
5. Control of other factors must be worked out for the best in results.
6. Capable personnel to develop and administer the plan must be obtained.

Pitfalls
1. Deterioration of safety.
2. Use of the plan as a "whip" for production.
3. Partiality in application of standards.
4. Flagrant use of adjustments.
5. Deterioration of base standards.

Incentives For Mine Foremen

What supervisory incentives are; how they should be applied; pitfalls to be avoided.

By C. W. Rountree Jr.
Director of Industrial Engineering
Island Creek Coal Co., Holden, W. Va.

MUCH EMPHASIS has been placed on the use of incentives as a tool for greater productivity and lower unit cost during the past several years. Industry has, for many years, provided hourly rate employees with incentive plans, and more recently has broadened the scope of incentive coverage to include supervisors. This article will discuss incentives for mine supervisors.

Just what is meant by incentive? The dictionary defines incentive as "that which incites or has a tendency to incite to determination or action." It further states that the love of money and the desire for promotion are two most powerful incentives to action. Leaving the dictionary for a moment, an incentive in the industrial world is setting up a target or objective and rewarding the man for attaining that target or objective.

Bonus v. Incentive

There are, in general, three types of so-called incentive plans for supervisors. Two of these must be classified as "bonus plans." These are (1) the Christmas bonus and (2) profit-sharing bonuses.

The Christmas bonus is generally an outright gift without any formal plan for determining payment. Generally each supervisor on a certain level receives the same bonus as all others on that level without regard for the efficiency exhibited by the individual in performing his job. This then does not qualify as an incentive plan.

The profit-sharing bonus is generally another outright gift based on the level of profits attained by the company. However, this more nearly qualifies as an incentive plan, since a formal plan generally is followed and, in many cases, formal appraisals are the basis for individual payments. However, this type of plan seldom reaches to the level of the foreman since a concrete means of actually measuring performance seldom exists.

The type of incentive plan that can be applied to supervisory employees and meets the qualifications is one under which the supervisor is measured through direct application of standards to the work performed by men under his supervision. It is a plan such as this that we are primarily interested in discussing here. While time does not permit detailed discussion, the highlights of such an incentive plan for mine foremen include:

1. Advantages of an incentive.
2. Factors that must be resolved in setting up such a plan.
3. Pitfalls that must be reckoned with and eliminated.

Company benefits from an effective incentive plan are:

1. Increased production through better supervisors.

2. Better management through better supervision made possible by the desire of the supervisor to do a better job.

3. Better satisfied supervisors through recognition of their individual or collective efforts.

The benefits to the supervisor are:

1. Elevation of his ability through his own efforts, which also provides a satisfaction of ego.

2. Formal recognition of performance, which enhances his chances of promotion.

3. Recognition of his doing a better job than some other supervisor receiving the same base pay.

4. An answer to the question every supervisor asks himself at one time or another: "How am I doing in my work?"

Setting Up Incentives

Concluding that an incentive plan is desirable, how then should we go about setting up a plan? Several factors must be considered and worked out in advance. Some of the more important are:

1. Standards To Be Developed—This is of major importance. Standards must provide equity, and to do this they must be based upon time studies made by competent personnel. You must make the decision as to the extent of evaluation you are

Abstract of a paper presented at the 1957 annual meeting of the Kentucky Mining Institute.

going to consider. Are you going to measure only production performance, or are you going to measure cost, safety, quality, maintenance, etc? Remember that every factor measured must have some standard by which to measure. Generally, it is more effective to develop standards for production first and then broaden coverage to include standards for these other factors.

2. How Will Measurement Be Accomplished?—After standards are developed, they are of no value unless they are properly applied. Provision must be made for evaluating the effect of the varying conditions in all mines. This is then a job of providing trained persons to apply the standards and evaluate the effect of conditions. These applicators must be impartial to provide for equity of standards.

3. Extent of Coverage—In determining those supervisory positions that are to participate in the plan each category of supervision should be evaluated on the basis of that position's contribution to improved performance. After evaluation, each supervisory position that contributes should be included and the degree to which that position participates should also be evaluated on the basis of the contribution. If a supervisory position does not materially contribute to improved performance then that position should be excluded from that particular participation. For example, a slate foreman, as we have, does not participate since his work is generally far removed from the actual production and deals with future working locations or cleaning up gob along the main line. Production will continue regardless of effort on his part. On the other hand, a moving foreman does have a direct contribution to make in completing the move-up on time, with properly laid loop track, properly set elevator, etc.

4. Basis of Participation—How far are you going to be able to go with your standards? Are you going to be able to provide specific standards for the various positions, or do you want to provide general coverage? Specific coverage would mean that standards must be set for the specific job at hand. As an example, to specifically measure the performance of a chief electrician, standards would have to be developed and applied for every repair job done. Then, using the chief electrician as an example of general coverage, that job could participate in the performance of all sections in the mine and an incentive would be provided for that job as well as measurement of the maintenance job being done. It is felt that general coverage is more desirable as a start, with specific coverage later as time permits development of specific standards.

5. Development of Controls — Assume we have an incentive plan for production performance. We cannot allow other activities to deteriorate because of desire for production. For example, short cuts in safety should never be tolerated. Therefore, it is necessary to install controls to maintain a balance between production and other factors. One form that controls can take, offered as a possible solution to the problem, is the use of objectives. Periodically, each mine must be appraised against these objectives and adverse factors corrected. Objectives can be set for any factor and any mine can be appraised against these factors. Objectives should at least be set for:

1. Safety.
2. Cost.
3. Quality.
4. Mine planning and development.
5. Labor relations.
6. Other factors needing control.

6. Capable Personnel To Install and Administer the Plan—Personnel familiar with the techniques of an incentive plan and the pitfalls that can be encountered should be used. A plan not properly administered can become a bigger headache than the operation of the mine. The job of developing, installing and administering a plan is a highly specialized one and requires the services of a specialist. Pitfalls must be recognized before they become pitfalls, and steps must be taken to eliminate them.

Let's look at some of these pitfalls very briefly.

Failure To Be Sold and Remain Sold—The plan must be sold not only to top management but to all levels of management. Selling must continue constantly through innovation of new ideas and cost reduction programs.

Deterioration of Safety—Short cuts in safety cannot be tolerated and must be recognized and corrected. At Island Creek the personnel applying the standards reserves the right to put a section "off standard" for improper safety practices. A strong safety department is necessary.

Use of Incentive Plan as a "Whip" for Production—When used as a "whip," morale deteriorates, production suffers and foremen become disgruntled and upset. Use the plan as a tool rather than a "whip." When used as a tool it enables mine management to (a) spot trouble points, (b) visit trouble points to find out what is wrong and (c) provide that foreman with the necessary help to raise his production.

Partiality in Application of Standards — Partiality can come in two forms: first, on the part of the applicator through personal reasons and, second, through submission by the applicator to pressure from the foreman for lower standards.

Flagrant Use of Adjustments—Standards can deteriorate very quickly if allowances controllable by mine management are permitted to creep in. When that happens standards no longer provide an accurate measurement nor do they provide proper incentives. As an example, an allowance for poor power because of inadequate copper raises the performance and gives no indication to management of the coal being lost through insufficient copper. An adjustment such as this then begins to spread and confidence in standards by both top management and local management is lost.

Deterioration of Base Standards—Whenever methods, crews, equipment or practices change, standards should also change. Failure to make changes results in inequities in standards and incentive payment.

How can these pitfalls best be eliminated, or at least recognized? The answer can best be expressed in two words: "Competent organization." By competent organization, in this particular instance, I mean an organization that has been sold on the proper use of an incentive plan from the top to the bottom, backed up by proper administration of the plan to realize the full benefits. An objective viewpoint must always be foremost in the thinking of management personnel, including the foreman receiving the bonus. With objective thinking, an incentive plan becomes a successful undertaking.

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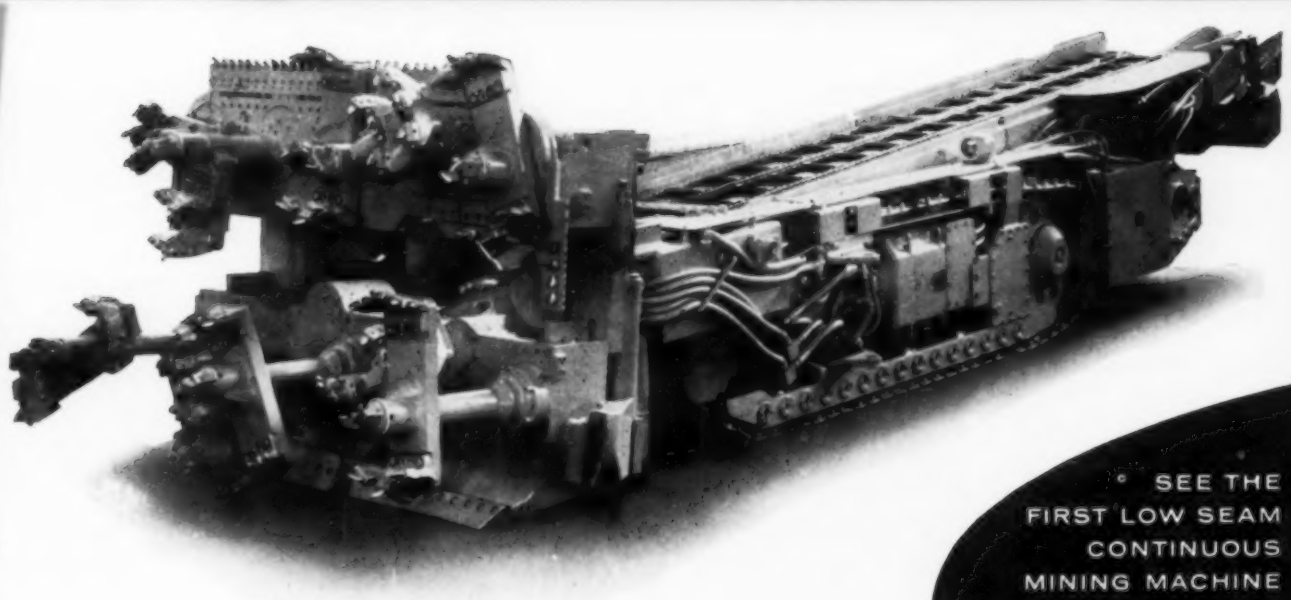

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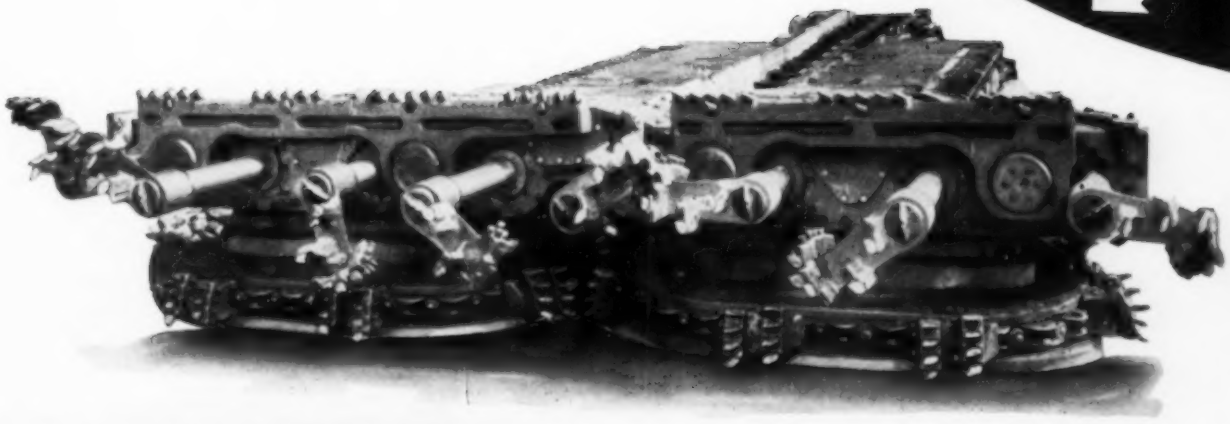

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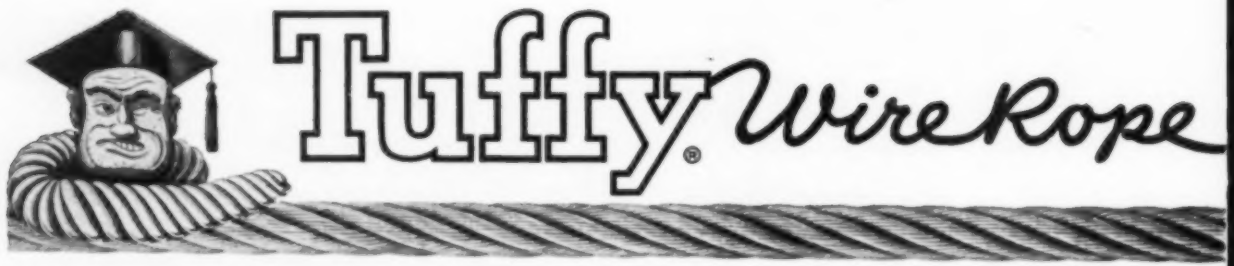
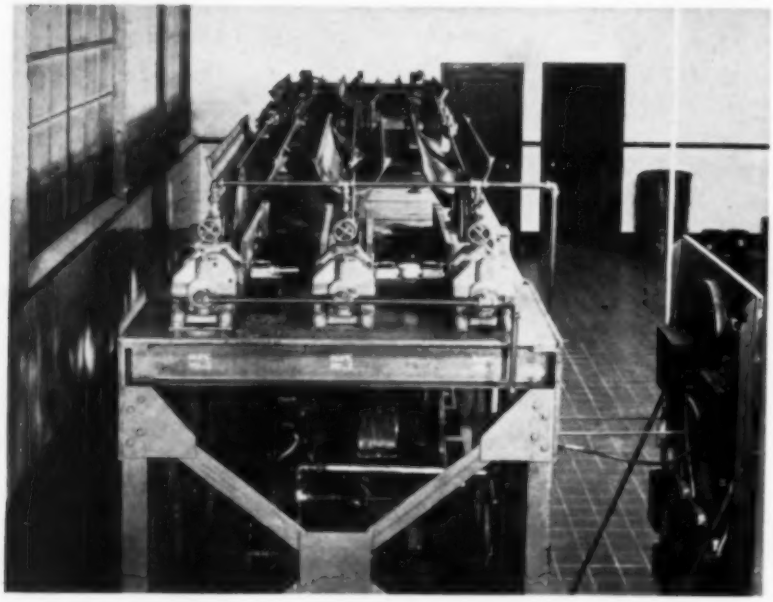
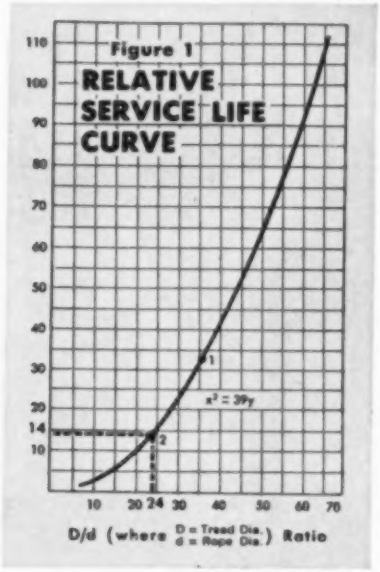






How Union Wire Rope Fatigue Tester Scientifically Predetermines Rope Life

How much service life can you expect from a given wire rope construction? Until recently there was very little factual data to answer that question. Predicting how long a certain wire rope would last under a given set of operating conditions was largely a matter of guesswork, trial-and-error and generally inexact calculations.

Knowing that bending stresses are a major factor in wire rope life, Union Wire Rope engineers designed the Accelerated Fatigue Tester, shown above, to pin down the effects of bending. Now, from a long series of bending tests, scientific data has been accumulated and organized to take the place of former rule-of-thumb methods.

"Preview" of Service Life You Can Expect

The data established by this laboratory research is based on the effects of various sheave diameters on bending stresses of various constructions of wire rope.

From test data, bending life curves have been plotted by Union Wire Rope Engineers for each of the more widely used rope constructions. Analysis of each of these curves showed them to follow a pattern expressed by the curve shown in Fig. 1 at right, above.

Note on Fig. 1 the curve shows that as the ratio of tread diameter to rope diameter increases (see D/d figures at bottom of chart) the longer the relative service life as expressed by the figures at the left of the chart.

However, there are few pieces of equipment on which sheave and drum sizes can be large enough to afford D/d ratios above 50. From test data the general-purpose range of D/d ratios was determined. Those recommended are set up in Table 3.

Spotted on the curve, for example, is the D/d ratio of 24 at point 2 and D/d ratio of 36 at point 1—these being the range for general purposes taken from Table 3 for the 6x25 filler rope. Moving from these points to the left on the chart, the relative service life of this rope ranges from 14 to 34 units of any service measure used, such as yards, tons, days, etc. 58-2

Table 2

BENDING-LIFE FACTORS
When Using Curve of 6x25 FW

CONSTRUCTION	FACTOR
6x7	0.57
18x7	0.67
6x17 Seale	0.73
6x19 Seale	0.80
6x21 Filler Wire	0.92
6x25 Filler Wire	1.00
6x31	1.00
8x19 Seale	1.14
6x37	1.33
8x19 Warrington	1.33
Tiller Rope	2.00

Table 3

SHEAVE DIAMETER FACTORS

ROPE CONSTRUCTION	GENERAL PURPOSE RANGE D/d Ratios	Where D = Tread Dia. d = Rope Dia.
6x7	63	42
18x7	54	36
6x17 Seale	49	33
6x19 Seale	45	30
6x21 Filler Wire	39	26
6x25 Filler Wire	36	24
6x31	33	22
8x19 Seale	31	21
6x37	27	18
8x19 Warrington	27	18
Tiller Rope	18	12

Tips

Now to determine the relative service life of say a 6x37. Its bending life factor (see Table 2) is 1.33 as compared to 1.00 for the 6x25 filler wire. Multiply the service life readings of 14 and 25 for the 6x25 filler wire by 1.33, and we find the service life range of the 6x37 falls at 18 and 27 units of service. Relative service life of other ropes are determined in the same way by using the bending factor indicated for each as the multiplier.

Of course bending is not the only wear factor in wire rope operation. Hence the general rule—that more flexible ropes should be used as bending stress increases with decrease in diameter of sheave or drum—has to be modified in field use. Other principal operating conditions—in addition to bending stresses—that affect wire rope service life are loading conditions, portability, corrosion, abrasion, rope speeds, materials handled, and equipment design. You can get further information on all wear factors from your Union Wire Rope distributor or the Union Wire Rope Corporation engineering staff.

Ordering is ABC-Simple!

No complicated codes or long list of specifications. Just say "Tuffy", give type (Scraper Rope, Dozer Rope, etc.), length wanted and size. Just that easy!

Good Man to Know: Your Nearby Union Wire Rope Distributor

Whether your wire rope need is a scheduled replacement or a red-hot emergency, your Union Wire Rope distributor is ready with "right-now" service. He keeps varied stocks of Union standard constructions and the Tuffy Special Purpose Ropes. And he's backed by quick service from his nearby Union Wire Rope depot.

If it isn't rope you need, but advice on a wire rope problem, he's just as ready to help. If you don't know your Union Wire Rope distributor already, look under "Wire Ropes" or "Slings" in your telephone directory yellow pages.

Excessive strength can make a rope "muscle-bound"... Wire Rope must be

BALANCED

Buying wire rope on the basis of strength alone leaves other important properties out of consideration. Wire rope, like athletes, can be "muscle-bound" with too much strength.

Strength is not always the answer to the question of the proper rope to use. Strength does not increase flexibility, resistance to crushing, abrasive or fatigue-resistant qualities. Strength does not compensate for the core crushing which accompanies excessive loading.

The Tuffy ropes are engineered for each end-use of the different types of rope. The combination of strength, toughness and flexibility is different for each application. The way to be sure your rope is BALANCED for its job is to use Union Wire Rope. Get in touch with your Union distributor.

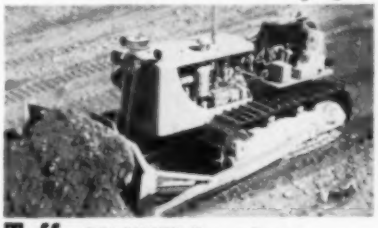
Tuffy Special Purpose Ropes: tailored and BALANCED for special uses

Tuffy BALANCED Slings & Hoist Lines

Top-performing team in every type of materials handling. Tuffy Slings are made of a patented, machine-braided fabric; stays extra flexible, can't be seriously hurt by knotting or kinking. Tuffy Hoist Line is a special construction of super flexibility and toughness.

Tuffy BALANCED Scraper Rope

It's flexible enough to withstand sharp bends, yet stiff enough to resist looping and kinking when slack. Moves more yardage per foot because it's specially built and balanced to take the beating of drum-crushing abuse.



Tuffy BALANCED Dozer Rope

Built to give you longer service with less downtime. 150' reels of 1/2" or 9/16" mounted on your dozers allow you to cut off worn sections without wasting good rope. Put Tuffy Dozer Rope on the job and watch costs go down!

Tuffy BALANCED Dragline Rope

Made to give you maximum abrasive resistance with super flexibility. Rides smoothly on grooves; hugs the drum when casting for full load. Consistently dependable in handling any material — wet or dry dirt, sand, gravel, rock, cement or minerals.

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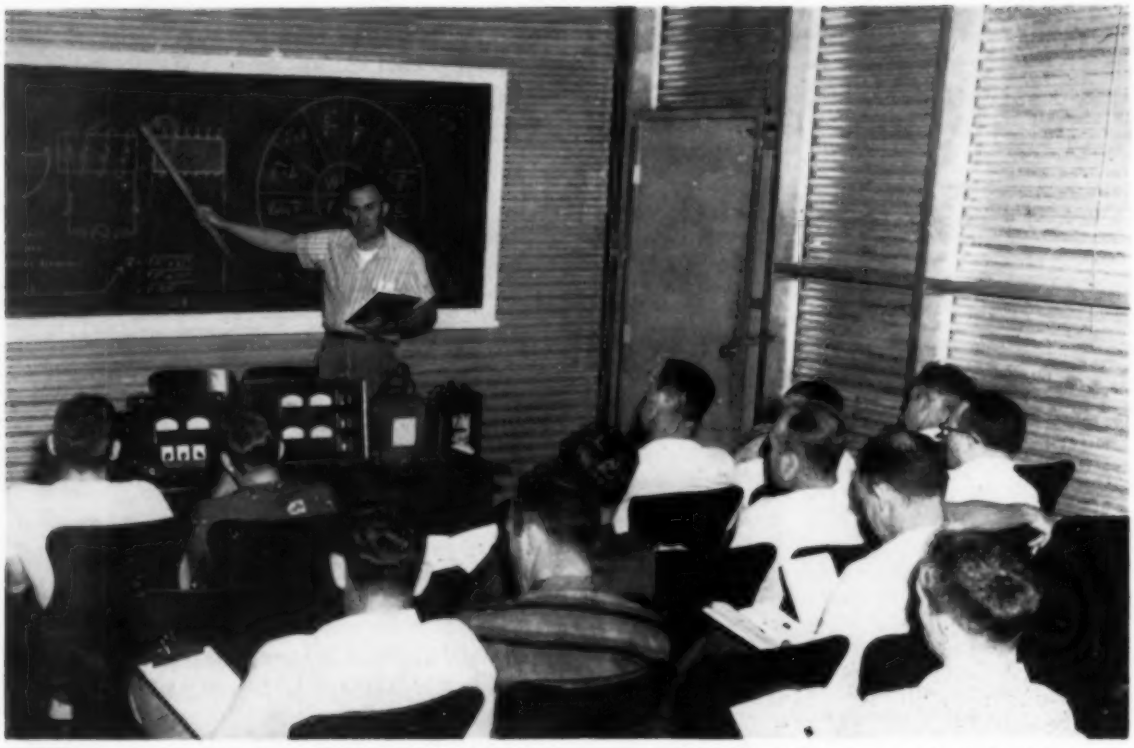


CLASSES to train men already employed are designed to help men upgrade their skills. A 60-hr course in basic electricity is now underway at Stonega's central shop. Company also owns complete film series on basic electricity.

Training: Foundation of Better

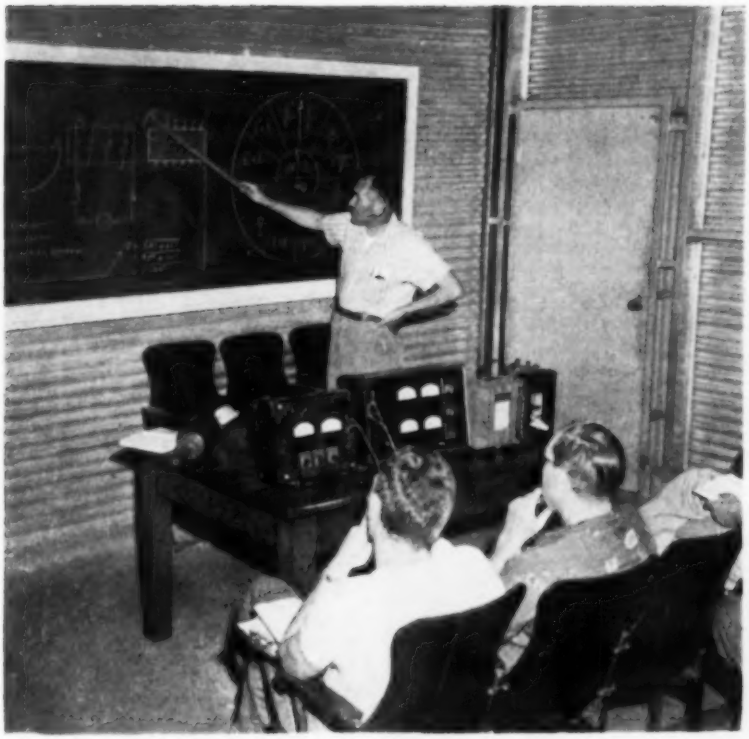
FOUR POSITIVE STEPS to better maintenance are paying big dividends to the Stonega Coke & Coal Co., Big Stone Gap, Va. These four major actions to improve maintenance at the company's mines are:

1. Setting up of an 18-mo shop training program for young men interested in becoming maintenance men.
2. Establishment of a training program for men already employed.
3. Initiation of a rebuilding program for mine equipment.
4. Instituting a branch of the Mining Electro-Mechanical Maintenance Association (ME-MMA) in the area for all those interested in maintenance.

What are the results of the program? First, management became aware of the desire of young men for careers in mine maintenance. Before Stonega set up the shop training program, young men hesitated about attempting to aim at a career in maintenance because they thought it too difficult. But as soon as the shop training program was made available, the company was swamped with applicants. Thus a reservoir of potential maintenance men was created.

The second major result of the program was to arouse the interest of older men now employed as mechanics but wanting to improve their skills. This resulted in a better overall maintenance team.

REBUILDING of all types of unit assemblies for underground machines is another important part of the 18-mo training program at Stonega Coke & Coal Co.



TEACHING AIDS include large blackboard for making sketches or working problems and a variety of testing instruments on demonstration table.

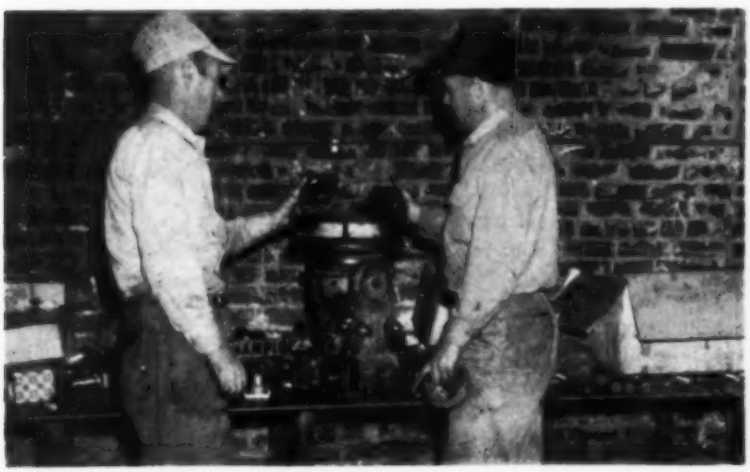
An 18-mo shop training program for young men provides a reservoir of potential maintenance men. Interest of older workers is increased by special course for them. Improved skills of men result in less down time.

Maintenance at Stonega Coke & Coal

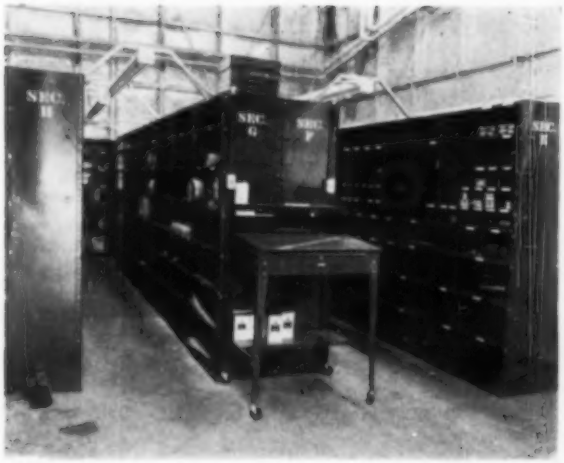
The third gain was the development of better prepared underground maintenance men. For instance, Stonega had to place some of the trainees in the mine as section mechanics before they had completed the 18-mo training course because experienced men were not available to fill the jobs created by the company's changeover to complete mechanization. The company learned that such men already are farther advanced than some men who did not have the advantage of the shop training, and that they are on a par with men who have had 3 to 4 yr practical experience as mechanics.

A fourth benefit was a sizable decrease in down time at the face since the rebuilding program was started.

The company's emphasis on maintenance produced an extra benefit not entirely expected. When section foremen saw that men were being trained to do a better job of maintenance, they started to take an increased personal interest in the section equipment. They adopted a new attitude and started to take a long-range view of equipment maintenance. And in turn this was reflected in a growing appreciation of the advantages of taking a machine out of production temporarily for minor repairs instead of running it until it failed. The net result was a noticeable decrease in the total down time.



PERSONAL INSTRUCTION of trainee as he helps rebuild equipment is a key part of the shop program. Skilled workers explain function of parts.



SUPPLIES are catalogued and stored in well-marked bins at central shop. Only fast-moving items are kept at mines.

CONFERRING are T. J. Liddle (left), safety director, and C. B. Fulmer, power and mechanical superintendent.

ENLARGED CENTRAL SHOP has facilities for rebuilding all underground equipment. Repair center is located at Osaka, near center of the company's mining areas.

ARMATURE REBUILDING for all mines is done in special section of the central shop. All sizes of motors are repaired.

Selecting the Trainees

About 5 yr ago Stonega began a program to fully mechanize its mines. At that time the company employed 3,300 men and 55% of the coal was loaded mechanically. Over a period of 2 yr the company made practically a complete changeover to mechanized methods. As a result, Stonega now has only about 1,300 men on the payroll and produces 37% more coal.

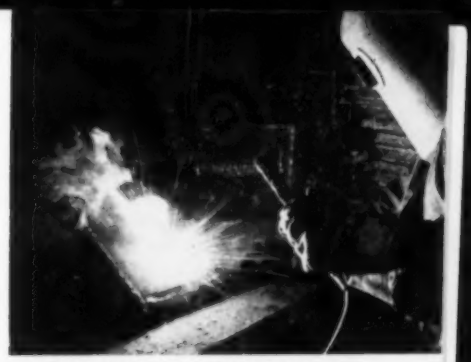
Because of seniority, the changeover left the company with a high proportion of older employees, while younger men were forced to seek work elsewhere. The older men were readily trained to operate the various machines. But 6 mo after the changeover was completed, the company was faced with a severe shortage of men possessing the necessary training and experience to maintain the equipment in top operating condition. The company also learned that some of the mechanics could not cope with all of the problems of maintaining modern machines. As a result Stonega decided to embark on an extensive training program to develop not only mine mechanics but also to provide mechanics capable of handling the major rebuilding jobs.

Here is how the system works. When a young man applies to the company for a maintenance job or as a trainee, he fills out a standard application form on which are listed his age, education and any special training or experience that would be useful to mine maintenance. Applicants must be 30 yr of age or under

Selecting the trainees from the many applicants was a difficult job. From the group first interviewed as potential maintenance men, approximately 50 were selected for personal interviews with Stonega's superintendent of power and mechanical department, assisted by the mechanical and electrical inspector. Results of the interviews then were reviewed by a group made up of the two men who conducted the personal interviews, plus the vice president and general manager and two division superintendents. But the group felt that final selections could not be made from the information on hand. Therefore the company decided to give applicants approved aptitude tests to determine their capabilities.

To obtain more specific information on the applicant's ability to learn or master maintenance work, the company uses two psychological tests. The first of these, called AA, meas-

EVEN A HALF HOUR of down time on a big stripping shovel like this one is extremely expensive. So the owner, Tasa Coal Company, uses USS "T-1" Steel extensively to increase service life. Tasa has experienced no failures of USS "T-1" Steel even when it takes hard daily pounding at below-zero temperatures.



WELDING USS "T-1" STEEL plates to worn cast bucket teeth. "T-1" Steel has *tripled* life of the teeth.

AUGER CUTTER HEADS get battered and abraded in really hard service. This entire head, except teeth and holders, was recently rebuilt by Tasa Coal Company with USS "T-1" Steel to insure good service life and to minimize repairs and maintenance.

In tough mining equipment . . .

WELDABILITY OF USS "T-1" STEEL PAYS OFF IN BUCKET REPAIR

The original bucket on Tasa Coal Company's 18-cu.-yd. stripping shovel was badly worn. The culprit, of course, was tens of thousands of tons of rock and dirt. So when new-bucket-time came around, Tasa felt they could increase service life by building the new bucket in their own repair shop from tough, strong USS "T-1" Steel plate. Results have been excellent!

No Fabricating Problem

The shop foreman told us that he had no difficulty welding USS "T-1" Steel. The welds have held up extremely well. After weeks of hard service in sub-zero temperatures they show no signs of cracks.

Other Applications

Tasa Coal Company has had good success fabricating USS "T-1" Steel for other parts, too. They weld ¾-inch USS "T-1" Steel plates, quenched and tempered to 321 minimum Brinell, to bucket teeth and thereby *triple* service life—increase it from just 5 days to 15 days.

USS "T-1" Steel has found a home in many mining applications. Its weldability and formability facilitate fabrication, while its very high yield strength of 90,000 psi and its amazing toughness and resistance to impact-abrasion help to reduce weight or increase durability.

Write for new technical bulletin

Our new booklet, called "T-1," gives you much useful information on fabrication procedures and possible uses for this versatile alloy steel. Write for it today!

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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USS "T-1" CONSTRUCTIONAL ALLOY STEEL

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UNITED STATES STEEL

ures mechanical comprehension. This test along with the applicant's education and training, serves as a preliminary screening.

If the applicant makes a satisfactory score on the first test and possesses all of the other necessary qualifications he is given a more advanced, or BB, mechanical comprehension test. If successful in the second test he is placed on a list as eligible for training. The first tests were given to 41 candidates selected from the men who had filled out employment applications. From these tests the company was able to cut the list to 12. This smaller group was given the BB test and two more men were eliminated. Since only seven men were needed it then became a matter of personal judgment to choose the first group of trainees. In the final selection the company gave preference to men who came from families of employees.

Six of the men were assigned to the rebuilding program at the central shop and one, who was felt to have sufficient experience, was assigned to one of the mines.

Before a trainee is hired, he is told that he must make his own way. He is given no guarantee of a regular job at the end of the training period unless he proves his ability to handle the work.

As those in training complete the course, new trainees will be hired to replace them. Thus the program is designed to provide a continuous flow of trained men to the mines.

Since the training program was designed to include a great deal of instruction time during the early months, the company decided to have only seven men in the first group of trainees. The 18-mo training period was divided as follows:

First 6 mo—Basic training in theory of electricity, mechanics and hydraulics backed up by on-the-job training as a helper on the maintenance crew in the shop. Trainees actually help tear down and rebuild complete machines.

Six to 12 mo—Evaluation period.

12 to 18 mo—Maintenance helpers.

After 18 mo—To mine mechanics if qualified.

During the 18-mo training program the men are paid the basic union wage. But it is clearly understood that the men are only in training and do not have any seniority.

Additional Training

To provide additional training for the men already employed as mine mechanics the company set up a second training program. The company had no problems with mechanical maintenance, but electrical work posed a problem. As a result a 60-hr course in basic electricity was set up for all employees. This will be followed with courses on other subjects.

A section of the company's new central shop building was set aside as a classroom. The room is equipped with a large blackboard, demonstration table and projector. In addition, a large variety of electrical instruments is available for classroom instruction. The company also owns a complete film series on basic electricity. Textbooks also are used throughout the training program.

At present there are 90 men enrolled in the course in four classes. Classes are held once a week for a 2-hr period for each of the four groups. Two classes are held on Monday, one for the day men and one for the night crew; one is scheduled for Wednesday night and the fourth for Friday night. To permit individual instruction and give all a chance to ask questions no more than 25 students are permitted in any one class. No written examinations are given. The instructor notes the progress of each man and passes it along to management.

To stimulate further interest in maintenance work, the company initiated the organization of a chapter of the Mining Electro-Mechanical Maintenance Association (ME-MMA). Already this group has a membership of 150 and meets once a month in the classroom in Stonega's central shop. At the ME-MMA meeting various manufacturers put on programs designed to help the men with specific problems.

How Maintenance Is Organized

All maintenance work is under the direction of C. B. Fulmer, superintendent of power and mechanical department. Under him are four separate departments:

1. Electrical—Takes care of all substations; rewires buildings and preparation plants.

2. Mechanical—Performs all types of work that cannot be handled at the mine, such as major rebuilding, machine shop work, or major installations at tipples.

3. Armature Winding—Rebuilds all sizes of armatures for all mines.

4. Transmission — Maintains the company's 33,000-V lines and transformers, builds new lines and maintains the company telephone system.

If any mine has trouble in any one of the four categories, a call to the central shop will bring an expert to the mine in 30 min. Supplies also are stored at the central shop and can be quickly sent to any mine. The system cuts down on the quantity of supplies that must be kept on hand. And control over supplies is simplified.

After the company converted to 100% mechanization, shop facilities and supply storage space were expanded to provide space for repairing and supplying the greatly increased number and variety of machines.

In addition to the central shop facilities the company has a chief electrician at each mine. He is responsible for all electrical and mechanical maintenance at his mine. Under him is a gang leader who takes the lead in maintenance in the various underground sections. If a section mechanic has a breakdown in his area and, after checking the trouble, finds that it is serious, he calls the gang leader, who helps speed the repair work.

Each mine also has a small repair shop where mine mechanics can perform the small repairs that ordinarily cannot be done efficiently in the working area. Major rebuild work always is sent to the central shop.

To select which equipment will be sent to the central shop for complete rebuilding, the superintendent of the power and mechanical department meets with the division superintendents to determine the order in which machines will be rebuilt. Then an accounting procedure is set up for each job for charging the cost. An estimated cost sheet is set up for each job and a reason is included for making the repairs. The final cost of a rebuild job is charged to the section from which the machine came. Shop overhead is prorated among the various mines according to the work done for a particular mine.

This long range revolving shovel is one of two Bucyrus-Erie 190-Bs working in large open-pit mine near Central City, Ky.

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Bucyrus-Erie Electric Shovels Set the Pace

Wherever coal is mined, you will find Bucyrus-Erie electric shovels meet today's needs for increased output. Their advanced design assures not only high daily production but the month-after-month dependability that sustained big output requires.

The modern front end, with exclusive two-section boom, tubular dipper stick and twin dual hoist provides great strength for tough digging, along with reduced weight for loading more payload. Main machinery is powerful, capable of speedy work cycles. Ward Leonard variable-voltage control permits rapid acceleration and deceleration, assures extra torque when it is needed. Heavy-duty construction throughout means low maintenance, long life.

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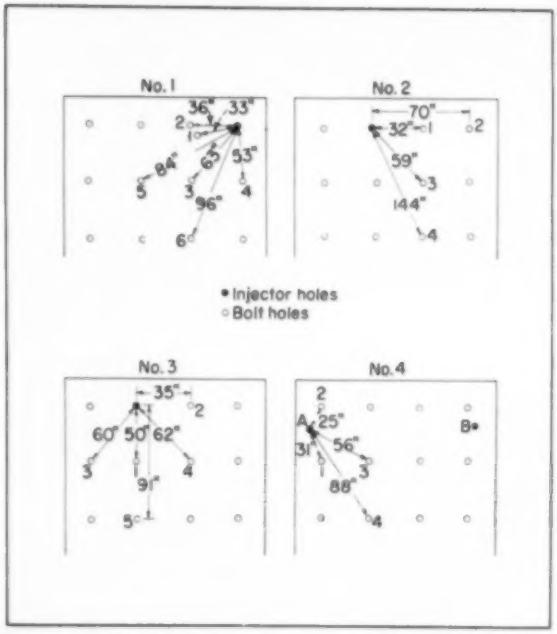


FIG. 1—**INJECTABILITY** of strata was determined in test setups such as these preliminary to bonding trials.

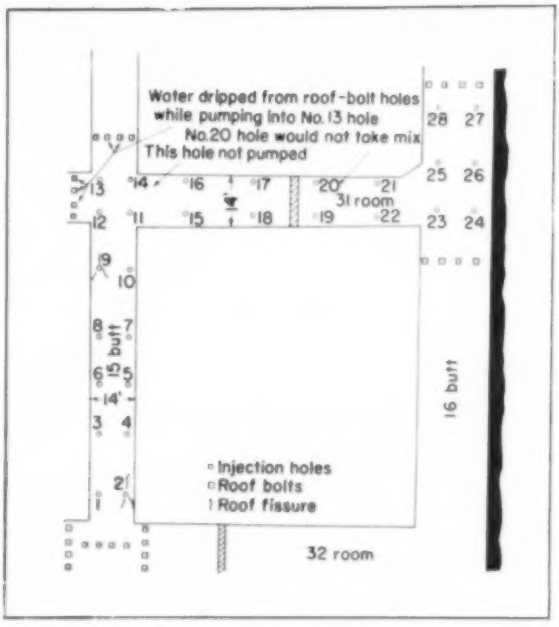


FIG. 2—**FIRST ROOF-BONDING EXPERIMENT** with epoxy resin and hardener was set up as in this test section.

Cementing Coal-Mine Roof

Test work indicates that epoxy resins with hardeners can be easily injected in mine roofs to convert the strata into a beam resembling plywood. Preliminary experience indicates good possibilities.

By **E. R. Maize,** Mining Health and Safety Engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

INASMUCH AS MORE THAN 70% of the roof-fall fatalities have occurred within 25 ft of the working face and

FIG. 3—**RESIN INJECTOR** being placed in roof hole prior to pumping.

FIG. 4—**TEST AREA AT INJECTION TIME,** including crossbars installed for protection during the injection operation.

60 to 70% of these beyond the line of permanent support, attention has been focused upon the necessity for better roof support in this relatively small area. In the search for better means of supporting and controlling coal-mine roof many methods and devices were, and still are, being considered and evaluated.

After a great deal of investigation and review of the reports of fatalities, the conclusion was reached that an attempt should be made to further strengthen coal-mine roof in place, since roof-bolting has given such favorable results. It was conceived that it might be possible to strengthen the roof over passageways, and possibly the roof in advance of a face, if a high-strength adhesive material could be injected into the bedding planes of the roof strata to bond them together, thus preventing lateral shifting and increasing the strength of the structure as a whole. In fact, if this system should prove successful a type of permanent shield would result.

Planning the Tests

The proposed method of strengthening the roof with a bonding material may be compared to the process of making plywood wherein thin, structurally weak, layers of wood are bonded together to form a member that is stronger than a like thickness of a solid wood.

When the proposal to study this means of roof support was approved, it was decided first to determine if fluids under pressure could be injected into coal-mine roof. The preliminary work of injecting fluids was, after a few setbacks, successful. This work has been reported in R.I. 5304, "Cementation of Bituminous Coal-Mine Roof Strata, Part I: Determining Penetrability of Mine Roof by Injecting Oil and Water."

I would be remiss if I failed to acknowledge the sympathetic reception the tests received from all phases of the industry. Manufacturers, particularly the Joy Mfg. Co., the Rockwell Mfg. Co. and the Bakelite Co., loaned equipment and manpower and gave advice without which it would have been impossible to advance to the present stage of development. Coal companies—National Mines Corp., Bethlehem Steel Co. and Pittsburgh Consolidation Coal Co. — willingly provided test areas and manpower. The mine workers' officials, particularly in the safety division, voiced sympathetic understanding, and the interest of the individual miners and their ready personal help in the underground tests were most astonishing.

Injecting Oil and Water

Herein are the highlights of R.I. 5304:

The first injection tests were made at the Experimental coal mine of the Bureau of Mines, Bruceton, Pa. Water from a tank was forced into the mine roof through a sealer or packer by admitting compressed air into the water tank at 80 to 90 psi. In these tests water flowed readily through the bedding planes of the strata. In two instances the flow measured 54.7 and 45.9 gal in two 9-min periods. In most of the tests the water, other than a small quantity that emerged from test holes, was contained in the strata. Attempts to duplicate the tests in freshly exposed roof of a commercial coal mine were unsuccessful because of the low pressure of the test equipment. At this stage high-pressure equipment was developed and used in all subsequent tests.

High-Pressure Testing

The high-pressure equipment consisted of a permissible 4-hp motor directly connected to a hydraulic pump with the necessary electric and hydraulic controls. With this equipment it was possible to reach injection pressures of 1,150 psi.

Using the high-pressure pump, tests of the penetrability of the roof strata were made in several commercial coal mines operating in the Pittsburgh and Upper Freeport coal beds. In these tests hydraulic oil was injected into the strata, and pumping was continued until oil emerged from the roof. The procedure follows:

1. A roof bolt was removed from a hole near the face.

2. The injector, which consisted of two rubber sleeves mounted on an expanding bolt which forced the rubber against the sides of the hole, was inserted and tightened in the hole.

3. The lead from the pump was connected to the injector, and the oil was pumped into the strata.

Fig. 1 shows sketches of four tests in a mine in the Upper Freeport coal bed, which were typical of many of the tests in other mines.

Test 1—The injector was inserted to a point 12 in from the collar of the hole. After the pressure was increased 100 psi every 30 sec up to 1,000 psi, oil began to flow into the roof. After 35 sec, during which 0.6 gal was utilized, oil emerged from the three nearest bolt holes. Pressure in the hole was released. After a 10-min pause, the hole was repressured at 1,000 psi for an additional 30 sec, and flow was obtained to three additional bolt holes, utilizing 1.3 gal of oil.

Test 2—Test 2 was at the face of another entry. The injector was installed 12 in from the collar of a 60-in-deep hole. After the pressure was increased 100 psi every 30 sec up to 500 psi, oil began to flow into the roof. After 2 min 30 sec, during which 0.8 gal of oil was pumped, oil came out Bolt Hole 1. The hole was repressured an additional 3 min at 500 psi and had utilized 0.9 gal of oil when flow developed from Holes 2 and 3. In Hole 4 water drippers developed and increased in amount.

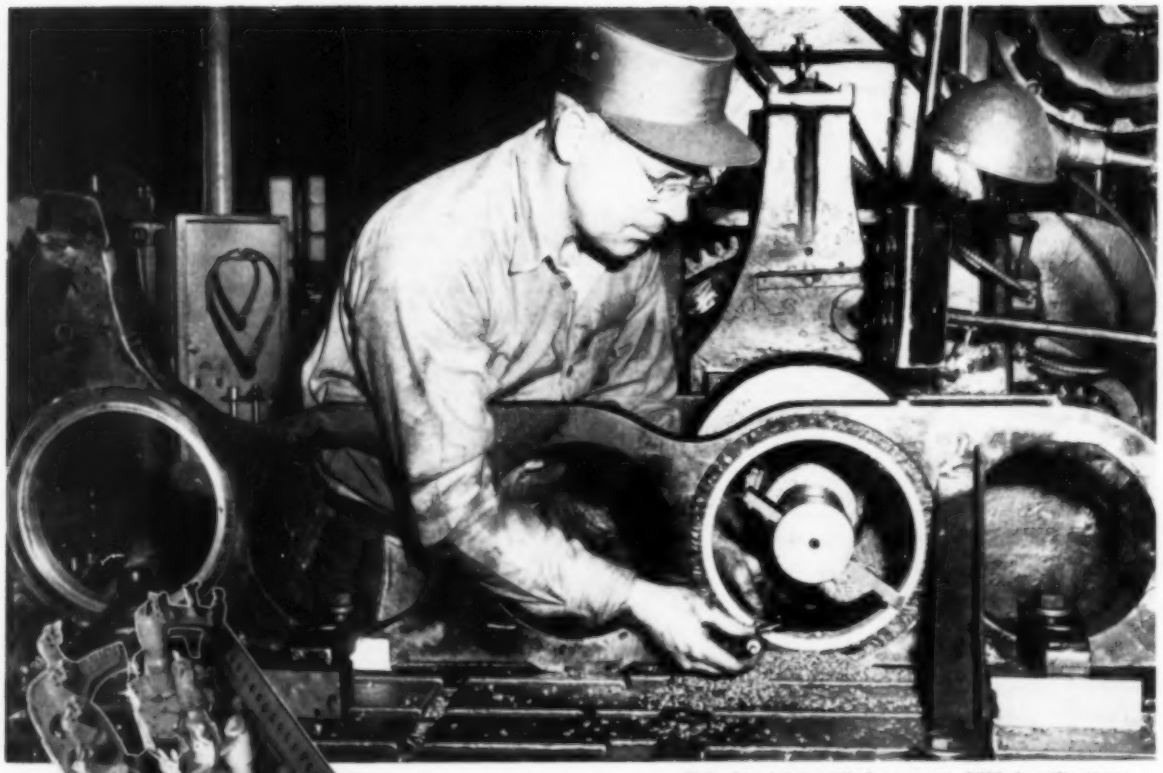
Test 3—Test 3 was at the face of a crosscut. A roof bolt was taken out and the injector was inserted 18 in in the hole. The pressure was increased 100 psi every 30 sec. At 900 psi oil began to flow and after the pressure was maintained for 30 sec, using 1.2 gal of oil, flow was observed from Hole 1. Shortly thereafter oil appeared in Holes 2, 3 and 4, and after 8 min water drippers were noticed in Hole 5.

Test 4—Test 4 was at the same location as Test 3. Holes A and B were drilled 1⅜ in in diameter and 35 and 75 in deep, respectively. After the injector was installed 8 in from the collar of Hole A, the pressure was increased 100 psi every 30 sec. At 500 psi oil began to flow into the roof. When oil flowed from the adjacent bolt holes, 0.9 gal had been pumped. Flow could not be obtained in Hole B at a maximum pressure of 1,200 psi maintained for 5 min.

Injecting Epoxy Resin

Following the successful oil penetration of roof strata in commercial coal mines in two coal beds, our next problem was to find a material

Abstract of a paper presented at the 1957 meeting of the Coal Mine Sec., National Safety Council.



Reboring 'cusp-cutter' to exact OEM Specifications at Leman's—a job not many are equipped for.

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that, having been pumped into the strata, would bond the members together and form a competent plate, or beam, as the case may be. Through correspondence with numerous chemical manufacturers and from visits to their research departments, the conclusion was reached that an epoxy resin appeared to have the desired characteristics of low viscosity, rapid setting time in thin layers, high adhesive as well as cohesive qualities, and should be tried. Other bonding agents were suggested, but to date we have not had the manpower or equipment to test them.

Epoxy resins are complex organic compounds in liquid form, requiring a second solution, called an "activator," to be mixed with them just before use to start solidification. The speed of solidification can be regulated through the selection of the activator or catalyst, several of which are available.

The activator used in our tests was hydroxyethel diethalene triamine. The resin and activator were manufactured by the Bakelite Co. and are designated as Resin ERL 2795 and Hardener ZZLD 0814.

Test 1—The first injection test of the epoxy resin was made on Jan. 7, 1957, in an area of Renton mine, National Mines Corp., that was being developed into blocks with entries on 80-ft and rooms on 100-ft centers, all driven 14 ft wide. The immediate roof was coal overlain with laminated carbonaceous and sandy shale.

Under normal operating conditions the roof is supported by 6-ft roof bolts, four bolts to the row and rows on 4-ft centers. In many instances, because of roof fissuring, it was necessary to supplement the bolts by posts and crossbars. In this test area the roof was exceptionally good, and additional supports were not being used.

To prepare the test area (Fig. 2), roof bolts were not used. The roof was supported by crossbars set on stub-hitched rails on 5-ft centers. Twenty-eight 72-in holes were drilled in pairs in a regular pattern spaced approximately 2 ft from each rib, with the pairs of 14-ft centers parallel to the direction of the opening.

The injectors (Fig. 3) were installed in each of the holes before pumping operations began.

A 4:1 mixture of resin and hardener was hand-mixed in batches of 1.75 gal as needed and was injected into the roof at a pressure of 1,150 psi in the order of the numbered holes. Each hole, except Nos. 14 and 20, was pumped to refusal. Hole 20 refused fluid and water dripped from Hole 14 during the pumping of Hole 13; therefore, it was decided to miss this hole.

The lapsed time of pumping the area was 4 hr 10 min. The total volume of resin and hardener was 29.75 gal. One and one-half gallons of fluid was injected for each 14 ft of entry, or ¾ gal per hole and 0.107 gal per linear foot of the exposed roof area.

It must be realized that the amount used per hole was not uniform. The roof at intersections had sagged, leaving greater voids than in areas of better natural support. In Hole 13, 8.74 gal of resin were used, against 3.50 gal in Hole 23. Resin was extruded from bolt holes 10 ft from Hole 13 during the pumping operation. On the day following the tests it was noted that resin had migrated to Hole 14.

(Continued on p 121)

FIG. 5—TEST AREA AFTER INJECTION and removal of crossbars.

FIG. 6—FISSURED TOP selected for second test of resin bonding.

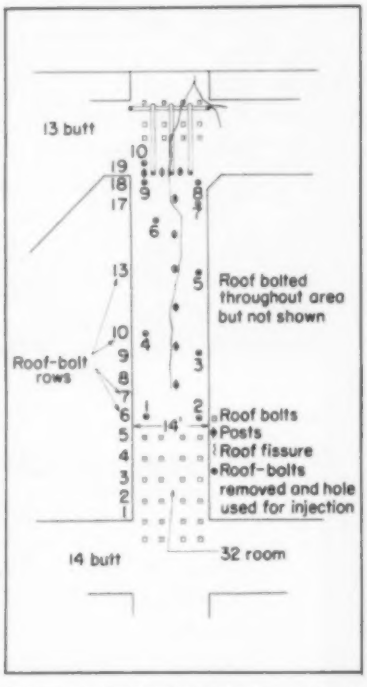

FIG. 7—INJECTION PLAN employed in testing bonding of fissured top.

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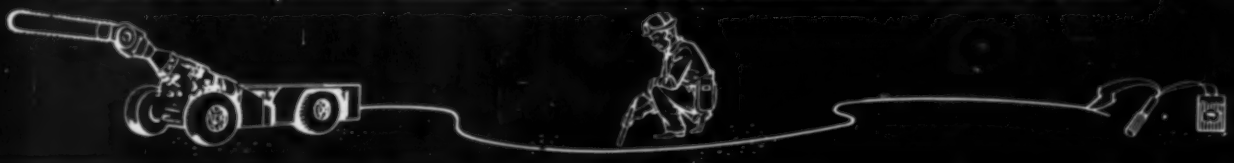


The crossbars supporting the roof of the test site were removed on the first shift of operations, and the area was dangered off following the pumping. The area was standing intact without roof falls up to the last report, about Sept. 6, 1957. Fig. 4 is a photograph of the test area during the injection time.

Test 2—The second test of the injection was made in an area two blocks away from Test Area 1. The test was made to determine the effectiveness of the resin in stopping a fissure that had developed in the entry. (Figs. 6 and 7). It will be noted that the roof is supported in a normal manner with roof bolts. The center posts had to be added when the fissure developed.

The equipment for injecting the resin was the same as that used in the previous test. During this test approximately 26 gal of material was injected into the roof through 10 roof-bolt holes spread over a distance of 55 ft along the fissure. Bolts were removed from their holes along alternate sides of the fissure. On the day following the injection the area was dangered off and the center posts removed. As of Oct. 21, 1957, the area had remained stable, with no further fissuring.

During the injection the flow of resin was across the fissure, and in several instances resin emerged from bolt holes on the opposite side of the fissure. None of the resin emerged through the fissure.

It was not possible to accurately determine the flow pattern of the resin in the previous tests. For this reason an attempt was made to inject resin containing a quantity of fluorescent dye, sodium fluorescence, into another test area so that the flow pattern and the number of horizons could be determined. In this work, four 72-in injection holes were drilled in the roof during normal development of the entry. These holes were spaced similarly to those of Test 1. Five gallons of resin were pumped into the four holes. The pumping time was 7.5 min.

Following injection of the resin into the roof, the roof was cored with a lightweight Joy core driller using a bevel wall N. X. diamond core bit (Fig. 8). The vertical cores contained resin in the bedding planes in the contact between the carbonaceous shale and white shale approximately 28 in above the normal roof line. We were fortunate in obtaining one core which showed that resin had filled the vertical cleats. An attempt was made to drill angle holes in the roof to search for more filled vertical cleats, but it was not possible to obtain good cores while angling across the bedding planes.

FIG. 8—CORING with lightweight drill to determine resin penetration.

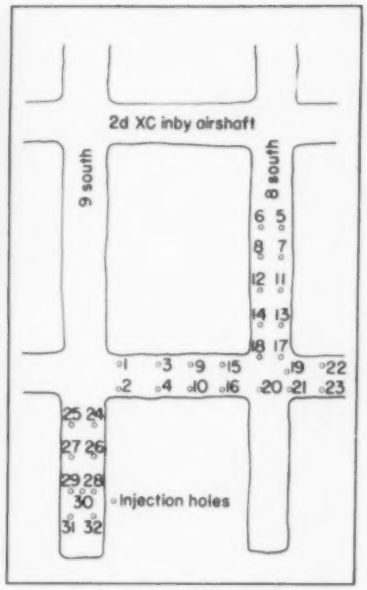


FIG. 9—INJECTION TEST SETUP in area with extremely bad top.

Test 3—This test was made in an area of the mine where the normal roof conditions were extremely bad. The general area consisted of eight entries being driven on 60-ft centers, with crosscuts on 80-ft centers. Normal roof support necessitated bolting with four bolts per row, with rows on 4-ft centers, and in most instances the bolt-supported roof had to be reinforced with steel crossbars on about 5-ft centers. Crossbars were erected in this area immediately after the next cut of coal was removed.

In the test site (Fig. 9), the normal pattern of bolting was discontinued and crossbars were spaced on 3-ft centers. Two vertical holes, 1½ in in diameter and 4 ft in depth spaced 2½ ft from the coal face and 3 ft from either rib, were drilled in the roof and injected with the resin mixture after each cut had been loaded out. Inasmuch as the average depth of each cut was 10 ft the pairs of holes were on approximately 10-ft centers.

The work was begun June 26, 1957, and completed July 23. A total of 179 gal of resin was injected in the two entries and the crosscut for a total distance of approximately 140 ft. The amount of resin per hole ranged from 0.3 to 24 gal. While Hole 7 was being pumped, resin was forced out of holes in the shale strata in the left rib. This is an area in which the roof fell above the normal roofline.

Where resin emerged from fissures or breaks in the roof, pumping was discontinued. Under normal conditions the holes were pumped to refusal. This occurred in 19 of the 32 holes. The other holes were not pumped to refusal for varying reasons.

Test Conclusions

The test work proved that resins could be injected easily into the roof strata over entries in the Upper Freeport coal bed. The flow pattern of the resin has not been accurately determined, nor has the depth of penetration over solid coal been found, but the work indicates that favorable results can be obtained.

The effectiveness of the resin in bonding roof structure has not been completely determined, but test results lead us to feel optimistic.

Additional tests must be made with equipment able to provide higher pressures. Tests must also be made in other coal beds before definite conclusions can be drawn.

FUNNEL-SHAPED CUTTING HEAD and barrel with interior flights handle cutting and conveying in new continuous miner designed for pitch work. Illustration shows the prototype machine with mining head raised to maximum elevation. Jacks permits positioning the head at various elevations to completely recover a face round.

New Continuous Miner Especially

Hollow barrel with funnel-shaped cutter head is the mining unit on new machine designed for use in pitching veins. Flights inside barrel move coal to bridge conveyor. Machine can cut to heights of over 14 ft and also can be used as timber-setter and cleanup unit.

By H. H. Gardner
General Manager,
Crow's Nest Pass Coal Co., Ltd.,
Fernie, B. C.

TRIALS of the new "Borecut" continuous miner have been most encouraging. The unit, a prototype model which has required some expected changes and revision, grew out of a desire to design a simple, relatively-low-cost continuous miner for pitch-seam coal mining. It was realized that such a machine must cut entries to any required shape when driving on strike, regardless of seam pitch, and preferably be able to cut to heights of at least 14 ft. Other requisites were:

1. A machine capable of loading loose coal or loose rock, as it is often necessary to do rock brushing in our entry driving.
2. Ability to lift timber into place.

Recent trials have amply confirmed that these requirements have been realized.

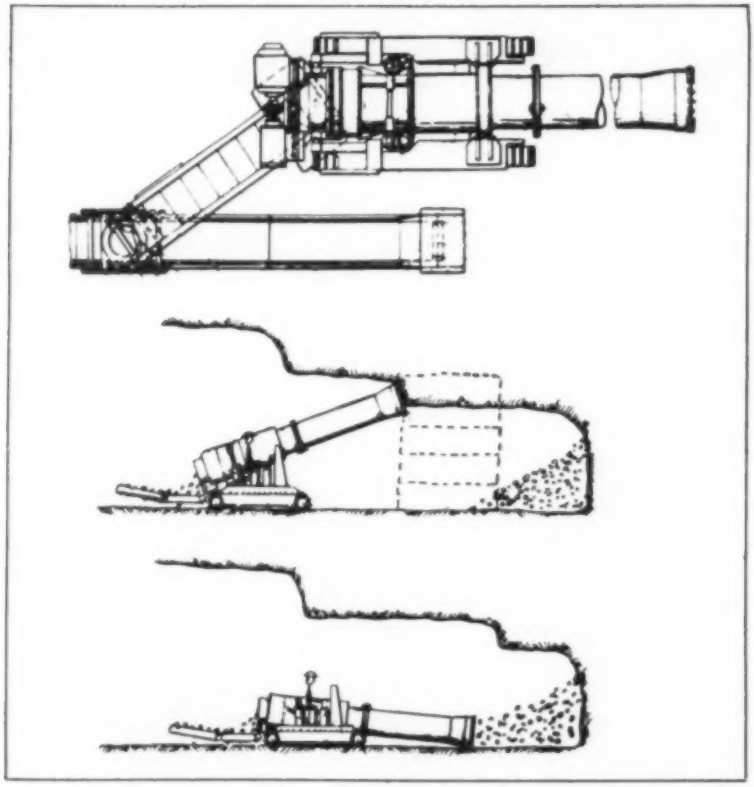
Canadian Ingersoll-Rand Co., Ltd., have undertaken the mechanical development and have rights to manufacture. Patents have been applied for. The prototype machine was designed under their orders by Henry Harlos, consulting mechanical engineer, of Vancouver. The Crow's Nest Pass Coal Co., Ltd., of Fernie, B.C., has supplied mining and shop facilities for testing. The author is the inventor.

During trials to Aug. 31, 1957, the machine worked 142 production shifts over 5 mo, driving 990 ft of entry, erecting 199 timber sets, mining 11,640 tons of coal, and loading out 41 cars of brushed rock.

Borecut Design

The machine is essentially a hollow

Abstracted from a paper presented at the 9th Annual Dominion-Provincial Coal Research Conference of Canada.



HOW NEW MINER is used with bridge and room conveyor, and how it handles cutting from floor level to maximum elevation are shown in these views from Australian patent application by Canadian Ingersoll-Rand Co., Ltd.

Designed for Pitches

rotating drive unit or barrel with an inside diameter of 23 in housed in fixed frame and bearings. This frame is carried on a transverse horizontal shaft at the rear, with two vertical hydraulic pistons at each front corner. A funnel-shaped cutter head is attached to the front of the barrel. The head is 15 ft long and is enlarged to a diameter of 4 ft at the cutting end. Cutter bits on the rim are set to cut a 2½-in kerf. The hydraulic pistons can lift the cutter rim to a height of over 14 ft. Within the barrel and funnel are spiral flights which convey broken coal to a bridge conveyor attached to the rear of the machine. The entire assembly is carried on crawler tracks, which permit complete maneuverability.

The Borecut is powered by a 75-hp double-end explosionproof electric motor operating on 550 V AC. One motor shaft rotates the barrel to provide a 400-fpm cutter-bit speed. It works through a fluid coupling, clutch planetary reducing gear and pinion-chain drive. The other shaft drives four hydraulic pumps by means of direct gearing. One pump serves to lift the barrel, one drives the bridge conveyor which in turn delivers to a loading conveyor, and each large volume-control pump supplies power to a crawler track. The machine is controlled by an operator who sits just ahead of the right crawler track, 12 ft from cutter ring.

Mining With The Borecut

The operation is most simple and direct. The funnel is placed below the roof on the right side of the face and advanced about 3 ft. Then the machine is retreated and the barrel and funnel are dropped 4 ft and advanced 6 ft. The machine is again retreated and the barrel and funnel dropped to the floor and advanced 6 ft. Thus the right rib is cut and a width of 4 ft of coal from roof to floor has been loaded into cars. The cutter ring is then again placed at the roof 4 or 5 ft to the left and another 4 ft of coal is removed and loaded into cars. This is continued until the entire round has been removed. The coal core breaks down in large lumps, passes through the barrel to the bridge conveyor, and then to the loading conveyor and into our large 10-ton cars. Allowing for car changes, 40 to 50 tons of coal are loaded per hour.

When the round is completed a small saddle is placed on the funnel. Then a steel or timber collar placed therein is lifted into place by the Borecut. Miners then place legs under the collar, slap set and wedge securely. The loading conveyor is then pulled ahead 5 ft by the machine, and the face is ready for another loading cycle.

Borecut Production

While in service, the machine has continually loaded out two rounds or better each shift. Including erecting timber sets each round, average output is about 100 tons with a four-man crew. Recently, in coal 12 ft high, the machine advanced 15 rounds in five consecutive shifts, erected fifteen timber sets, and loaded 700 tons of coal.

The present machine is 26 ft long, 7 ft wide and 5½ ft high. Weight is 11½ tons.

Field trials are continuing, with encouraging results. Experience to date has fully established the soundness of the mining and conveying principles incorporated in the basic design. These principles make the Borecut different in most respects from more "conventional" types of continuous mining machines, and permit its application as a continuous miner in coal and other soft formations, or as a general-purpose loading machine for virtually all materials, including hard rock.

In our mining operations, it is performing as no other available machine could, mining from the solid at any and all points on faces up to 16 ft high and 18 ft wide, loading out loose coal and rock, installing steel and timber collars, scaling high roof, and providing a mobile, easily maneuvered platform for roof-bolting.

ORIGINAL BIT WITH ENCLOSED TIP!

WHY CARBOLOY® CCS-2 BITS STOP TIP

"Phantom" view of Carboloy CCS-2 shows how the cylindrical tip is completely enclosed in steel to prevent tip loss and breakage.

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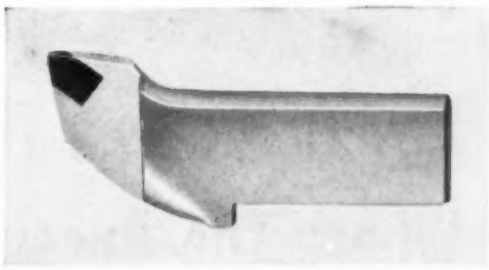
1 Carbide tip is enclosed in steel to stand more abuse

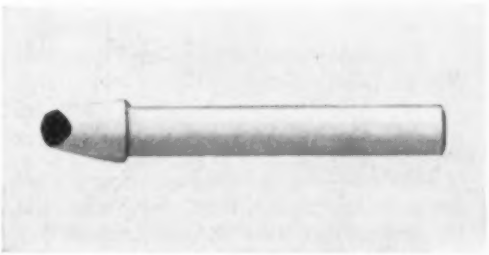
On the Carboloy CCS-2, a solid cylinder of carbide is enclosed in steel . . . and held in place by a combination of braze and mechanical holding. The carbide stays firmly in place, even in the toughest formations. So, the CCS-2 stays on the job longer, under conditions that quickly ruin bits of other design.



Cutaway of CCS-2 shows extra-long cylinder of carbide. Insert is brazed all around, and also held mechanically in place.

2 Shank and tip design cuts downtime, increases tonnage

On the CCS-2, the tip is positioned at the best angle to withstand cutting forces and make best use of the carbide's high compressive strength. The flare of steel behind the tip gives added protection against breakout. Result: less downtime for bit changes . . . more production per tool at lowest cost per ton.



Top view of CCS-2 shows how steel is flared behind carbide insert. This gives the double-held tip added protection against breakout.

The CCS-2 is the most widely accepted mining bit in the industry. Like all bits in the complete line of Carboloy Mining Tools, it is stocked by your local Authorized Carboloy Mining Tool Distributor. For more information, or in-mine assistance, call him today (his name is listed below). Or write: *Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Blvd., Detroit 32, Michigan.*

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Pay Of College Teachers... Where The Russians Are The Capitalists

This editorial deals with a simple question about college faculty salaries: Which country pays its teachers better, Russia or the United States? It's a good question, with a sadly embarrassing answer.

That American college and university teachers are underpaid is not a novel observation. But what has happened to the economic status of their profession can be put in more candid terms. **As far as financial incentives are concerned, we have virtually socialized the academic profession.** Teaching has become such a poorly paid career, with so little prospect of material reward for outstanding performance, that it simply does not attract enough highly qualified young men and women.

Ironically, the Soviet Union has deliberately and successfully used capitalist incentives to improve its educational system. Although the Russians show an utter disregard of civil liberties, they pay their teachers well and confer on them all the prestige and privileges the Soviet society can offer. Russian professors, together with party officials and scientists, have become the privileged upper class of a supposedly classless society.

Incentives To Be A Teacher

To be a college teacher requires high intellectual competence and long, sometimes costly, formal training. Aside from the appeal of academic life, what incentive does college teaching offer bright young men and women?

In the U. S., the average faculty salary is little more than the average income of industrial workers. According to the National Education Association, the average faculty salary is about $5,240. College instructors receive $4,100, associate professors $5,730 and full professors $7,100. The average income of U. S. factory workers in 1956 was $4,580.

Actually, workers in many industries — steel, automobile and petroleum, for example—earn more on the average than college teachers. And skilled workers often earn more than full professors at some of our colleges and universities.

In Russia, on the other hand, the young Soviet graduate can see that it pays — and pays very well — to choose teaching as a career. The head of a department in a Russian university can command a salary of about 6,000 rubles a month.* This is about eight times the income of the average Russian worker, who earns 750 rubles a month.

The Russian professor comes off very well in terms of what his income will buy. It has been estimated that, based on Soviet consumption patterns, 6,000 rubles a month is worth about $7,200 a year — or higher than the average professor's salary in the U. S. Of course, it is difficult to compare living standards in two countries as different as the U. S. and Russia. But particularly in the field of science — where the salaries can run to 15,000 or more rubles a month — it is clear that the Soviet professor enjoys a higher real income than that offered his American counterpart by a much more prosperous economy.

Incentives To Be A *GOOD* Teacher

Russia also offers much higher premiums than the U. S. to those who attain distinction in teaching. Teachers at the university level earn significantly more than teachers in high schools, and university instructors can look forward to a sharply progressive rise in earning power as they

* *Soviet Education for Science and Technology* by Alexander Korol of the M.I.T. Center for International Studies.

Can your haul units match these advantages?

Before you buy your next off-road hauling unit, make this test to see if you are getting the most for your money. Examine the various makes of haulers in the light of these features — standard on LeTourneau-Westinghouse Rear-Dumps:

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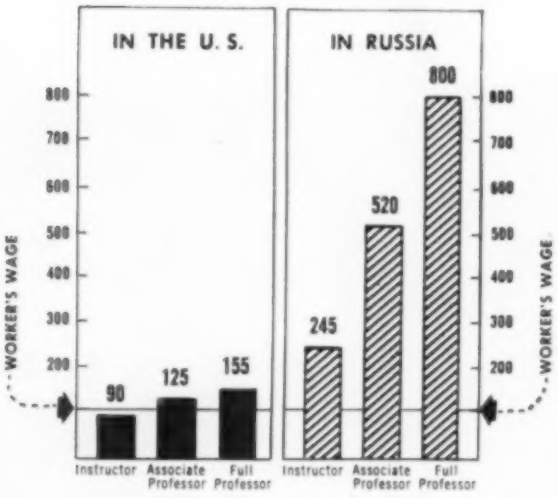
How Faculty Salaries Compare With Industrial Wages

(Worker's Wage In Each Country = 100)



*Sources: Center for International Studies, M.I.T.; National Education Association; McGraw-Hill Department of Economics

advance to higher positions. The spread between the income of a full professor and the lowest academic position is greater than fifteen to one. In addition, full professors can earn a healthy bonus if they are elected to membership in the Russian Academy of Sciences.

In the U. S., by contrast, full professors on the average earn less than twice as much as beginning instructors. And many college professors earn less than public school teachers in large cities. Even a full professor's pay does not compare with earnings in other professions or in positions in industry requiring similar training. The point was well summarized in a recent speech by Marion B. Folsom, Secretary of Health, Education and Welfare: "It is nothing short of a national disgrace that we are discouraging people who want to teach by offering salaries that are far below the levels justified by their training and far below the levels which others are willing to pay."

Our colleges and universities, as well as our teachers, find themselves in a serious predicament. Faced with a shortage of both funds and teachers, they cannot reward distinguished performances. Limited resources for salary increases have gone predominantly to the lower ranks, so that an adequate number of teachers could be retained. Meanwhile, potentially fine teachers are being siphoned off into better paid occupations.

The shabby treatment of our teachers threatens to undermine, not only our educational standards, but our free enterprise system itself. There is the recent example of a liberal arts college which discovered that five of its graduating seniors were being offered starting salaries higher than those paid any of their professors. It would be surprising if experiences like this did not place a strain on the enthusiasm with which these professors deal with some key aspects of American capitalism.

Also important is the role education is playing in the cold war with the Soviet Union. The Russians have made great strides in raising the quality of their education — particularly in science and engineering. Both the number and the technical calibre of their graduates are impressive, as recent Soviet achievements testify. These successes owe much to the generous economic treatment the Russians have given their teaching profession.

A Standard For Faculty Pay

Earlier editorials in this series have outlined various ways American business can help relieve the financial plight of our colleges and universities. They have suggested that private contributions to higher education should average at least $400 million a year over the next ten years if faculty salaries are to be raised to adequate levels and our colleges are to be able to meet increasing operating costs.

Another standard for raising faculty salaries proposed by an American businessman is this: "When a teacher's income gets up to a point where you will suggest to your boy that he ought to give some thought to teaching as a profession, then we may be approaching the right figure."

Russia clearly has set her teaching salaries well above the "right" figure. We are nowhere near it. What this adds up to is that the Communists — not we — have become the shrewd capitalists in the vital field of education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

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Shovel clean-up is only one of many jobs Tournatractor handles at Festus, Mo. for Aubuchon Silica Mining Division of Portage-Manley Sand Co. Working in extremely abrasive sand, and across uneven hard rock floors, has been no problem and maintenance costs have been very low.

How Aubuchon keeps ahead of tight production schedules

. . . cuts costs on tractor maintenance

Pit shovel, to wash plant, to rail car — in an hour. That's a normal scheduling at Aubuchon Silica Mining Division, Festus, Mo. Owned by Portage-Manley Sand & Gravel Co., Rockton, Ill., the firm ships many carloads a week of fine silica used in foundry cores and crystal glass.

Aubuchon does no stockpiling, depends on steady production to fill orders. Extended downtime on any machine, therefore, could halt shipments. One of the major availability problems is that of the pit tractor. Servicing the stripping and clean-up operations over the entire pit and plant area, this machine must continuously cross rough, rocky areas . . . working in silica so fine and hard it's been described as "sharp as grinding compound".

"Tournatractor® only machine that can do our tractor work . . ."

Since 1952, Aubuchon Silica Mining's tractor jobs have been handled by a rubber-tired LeTourneau-Westinghouse Tournatractor. As Plant Manager Ira Kent says: "The abrasion, rough going, and back-and-forth travel is too rough for crawlers. Tournatractor is the *only* machine we've seen that can do our tractor work."

Tournatractor's main assignments at this pit are stripping overburden to expose new sandstone, and cleaning up around shovels. But its rubber-tired mounting, sealed anti-friction drive, speed and "go-anywhere" ability let it take on a full circuit of haul-road building and maintenance, stripping, shovel and general clean-up dozing at the pit, mill, and yards.

Maintenance now no problem

How has Tournatractor stood up under conditions so tough? Let Manager Kent tell it: "The last crawler we had was junk inside of 11 months. We've worked Tournatractor 45 hours a week for almost 5 years, *with no real trouble*. On our rough hard rock floors and with free silica sand all over, that's something!

"Our one and only major repair expense in all that time has been replacement of the torque-converter oil-seal and bearings. We've never done anything to the engine . . . never broke an axle, chipped a gear, or had a single major thing go wrong!"

Ask for a demonstration

Tournatractor has minimized maintenance problems for Aubuchon Silica Mining, while doing a lot of work quickly, efficiently. Investigate now what it can do at *your* pit. Let us send you full facts and arrange for an on-the-job demonstration. No obligation!

Tournatractor has plenty of power to doze rocks too big for pit shovel. Big, rubber-tired machine also cleans up fast to let drilling crew set next charges earlier.

Stripping overburden, Tournatractor slot-dozes — using walls of slot as "natural sideboards". Method keeps dirt from spilling off edge of blade for bigger loads with same effort. "Fill-in" jobs like this keep Tournatractor busy the year 'round.

CT-1500-M-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Foremen's Forum

SAFETY AND PRODUCTION PROBLEMS—such as, how to improve roof safety—will be brought closer to solution with the help of production supervisors.

New and Novel in '58

1958 will bring a new look to many phases of our industry and new ideas for further progress.

Here is a view of what some of these changes will be and how they will affect your job.

In 1958 and the following few years, this industry of ours is going to show a great number of changes in production equipment and methods. We have seen more changes in the past few years than in any comparable period, and we believe this is solid indication that today's coal industry is eager to accept good new ideas. Furthermore, each new idea adopted generates a number of side effects which bring on still more changes. For example, continuous mining actually revolutionized coal production wherever it was used. It offered great advantages, but it also created some new problems which could only be solved through development of new techniques and equipment.

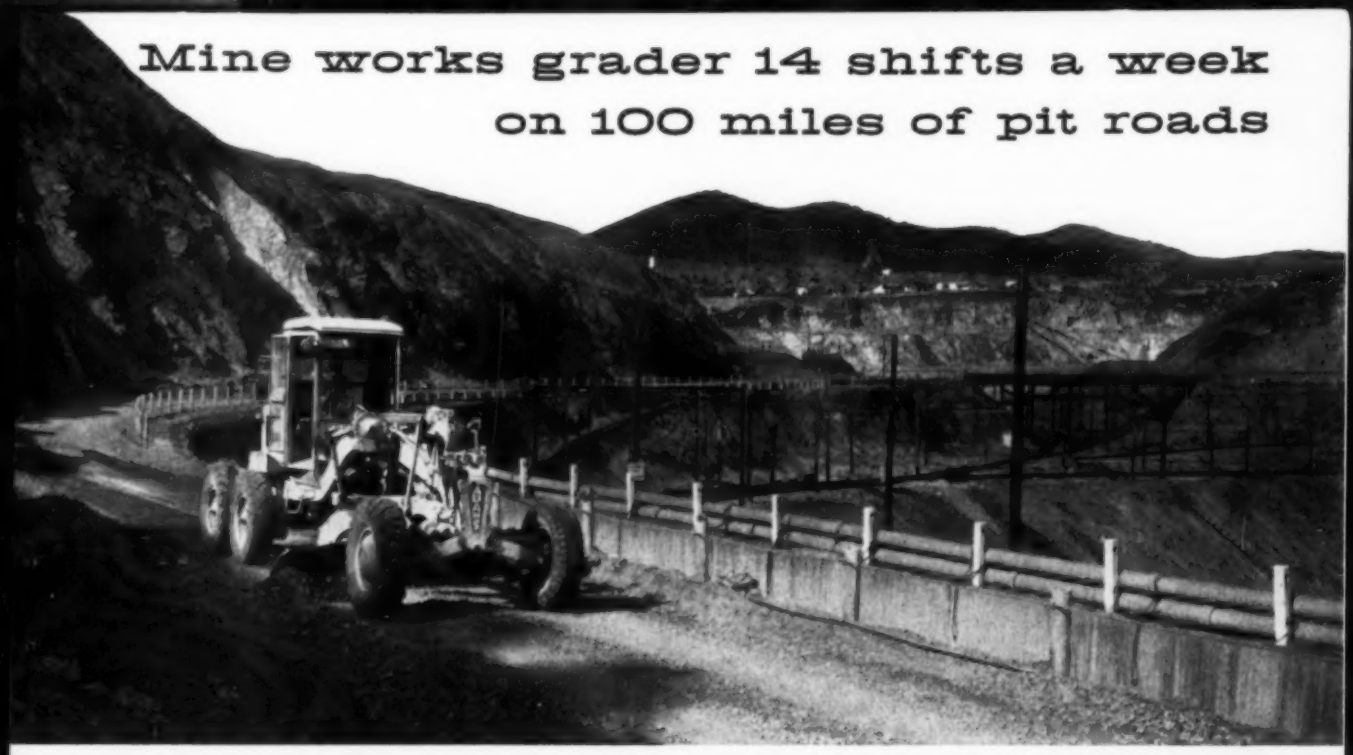
These technological changes naturally demand new responses from workmen and supervisors, as you well know. It is reasonable to assume, then, that changes yet to come will require similar reshaping of the supervisor's job.

Take a look ahead at some of the changes we may expect in the near future, and how these changes may affect you. Just run down this list of possible innovations in coal mining and judge for yourself the changes yet to come.

We may be cutting black diamonds with glass! The word has it that special heat-treated glass may be shaped into cutter bits. Not so long ago, anyone who made such "outlandish" statements would be suspected of having hallucinations. We think it is a sign of the times that most of our readers accept the possibility of using glass bits without batting an eye. Perhaps our attitudes reflect the fact that practical men today speak in practical terms of space travel.

It is conceivable that a plastic "sausage" stuffed with ammonium nitrate may be a boon to you, if you operate in a thin seam. We recently heard a description of a machine that might be designed to make use of such a continuous charge of explosives to perform continuous mining in low coal. The idea is that a coal drill could be designed to operate around a sort of gun

Mine works grader 14 shifts a week on 100 miles of pit roads



Fast-moving Adams 550 grader does lion's share of maintaining more than 100 miles of bench roads at big copper mine. This 123 hp unit grades, ditches, backslopes, does scattered clean-up work.

Two shifts a day, 7 days a week is the rugged schedule of work for a 550 Adams* motor grader at a big southwestern copper mine. 4 to 6 operators take turns manning this heavy-duty unit as it hustles about . . . maintaining more than 100 miles of steep, winding mine roads.

Adams handles many jobs

Roads at the mine coil around the huge open pit, along wide benches 15′ to 20′ high. Surfaced with crushed stone, roads vary in width from one to six lanes. Usually working in 2nd gear, the Adams 550 grades fast and accurately. It ditches, backslopes, does all-around work — such as filling ruts, leveling ridges, and cleaning up debris fallen from banks or spilled from haul units.

Tough assignments, long hours, are right down Adams' alley. Built to withstand severe stress and strain, these graders can take it!

Structurally, the "550" has a big, all-steel box frame for lasting strength and rigidity. It is continuous-welded to take stresses as a unit — from bolster plate to boxed-in rear end. Streamlined, front to rear, this Adams frame has no sharp bends, no cross-section welds, no bolted or riveted joints to break. Front axle is made of welded heavy bar and plate . . . with yokes, kingpins, and spindles of forged, heat-treated steel. This rugged frame foundation, outstanding in the industry, is a basic factor in Adams' accuracy of control, low power loss, and speed as well as its dependability and economy of performance.

Power-wise, the two engines from which you can choose have been job-proven in more heavy-duty construction and road maintenance use around the world, than any other engines available anywhere. Mechanically, all gears and shafts run on anti-friction bearings, and all clutches slide on ball bearings. The 8-speed transmission is the finest ever built for use in a motor grader.

Adams lasts longer, works harder

Net result is a motor grader that lasts longer, works harder . . . with less upkeep. From the utility 220 model, with 60 hp . . . through 80, 115, 123, and 150 hp sizes . . . to the big torque-converter POWER-*Flow* 660, with 190 hp . . . Adams gives you more grader for your money.

Look into the Adams line of heavy-duty motor graders. Your LeTourneau-Westinghouse Distributor has all the facts and will be pleased to arrange a working demonstration of the model that fits your needs best.

Twisting uphill grading is done faster with Adams 550, because it offers *several* full-power speeds for each kind of work. With 15-speed transmission available, operator can always select gear that will get the most work done at the lowest cost. *Trademark G-1485-M-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

barrel. After each 2-ft advance of the drill, a charge of explosives could be set off to break out the coal. The explosives would be fed into the gun out of a continuous coil of explosives, and the gases for breaking the coal would issue from ports near the muzzle of the gun. Two such drills and a bottom-trimming chain, installed on a low-type loading machine, might be what the doctor ordered for higher production in low seams. It's visionary, you might say, but so was roof bolting at one time.

Did you ever hear of allaying dust with hot water? We don't offer this as a world-shaking new idea. It is an example of one of the side effects that follow changes in procedures. This one involves a high-powered continuous-mining machine, using hydraulic power for a number of motions. The hydraulic system operates at a high temperature, high enough to painfully burn anyone who touches any of the hydraulic components. One solution is to increase the size of the fluid reservoir to provide more cooling area. But where space is critical, as it is in many mining applications, some other solution is needed. A suggestion we heard from an expert in hydraulics is that the hydraulic fluid be passed through a heat exchanger in the spray-water system, thus providing for disposition of excess heat from the machine in the dust-allaying water.

A built-in dust-collection unit may be an optional accessory on a new machine your company might buy. A compact, inertial-type collector now is undergoing tests to see if it can be adapted to underground use at the face. Dust could be collected at the source and immediately precipitated.

How about gluing your roof? Here we are, still in a state of amazement at the success of roof bolting, and now we hear of intensive research in the possibilities of binding roof strata together through the use of adhesives. The big value in this method, if it can be made feasible for underground use, is that the binding of the rock layers can be done before the coal is removed to make the immediate face area safer. The adhesive resins can be pumped into the roof ahead of the advancing face. You can read more about this in the article beginning on p 116 in this issue of *Coal Age*.

Remote control of underground mining machines is another possibility. Such machines have been successfully directed to distances of 800 ft into coal seams from open-pit launching sites. These machines haul their own transportation units along as they penetrate the coal, and the operator controls the assembly from a console at the outby end of the opening. Designers of the machine tell us every effort is being made to adapt the system to underground use.

New applications of materials also are in the limelight. New preparation plants are being built today with stainless-steel sheating. It sounds expensive, but you can be sure the savings in plant-maintenance costs justify the practice.

As this trend to fuller automation gathers momentum, it will create a need for closer observation of unattended units that may be great distances apart. What better way to put far-flung processes under an expert operator's control than to provide him with industrial television? We have only scratched the surface on this one.

The foregoing examples provide only a glimpse of the changing pattern in the industry. However, even this fast look makes it evident that special skills will be required of the men who manage these activities. In fact, our existing skills will have to be sharpened and the new skills will have to be developed, concurrently.

Here's what we mean. Every foreman today understands the principles of ventilation and how air should be conducted to the face and away from it. In hand loading, and even in conventional mining, it was possible to handle the air without too much strain. A boss had to be very careful, but minutes were not as critical as they are now in continuous mining. Greater volumes of air must be caused to flow without interruption over these fast-moving machines.

The responsibility for keeping this critical service up to acceptable standards rests with the foreman. He must be sharper in his supervision of the men who build doors and stoppings, and he must insist upon highest standards in erecting line curtains.

On the other hand, new ideas for ventilating continuous-mining sections are being offered and discussed. Safe, controlled application of auxiliary fans is one possibility that is finding an increasing number of advocates. The foreman will have to learn how to apply these auxiliaries safely and how to supervise their use. Therefore, it is clear that the foreman in a modern coal mine must be sharper in applying current practices, while he assumes the added responsibility of keeping abreast of new developments. The changes are coming faster than ever before.

Another example of how this will work can be shown in the roof-control phase of operations. Right now the industry relies on strict adherence to standard roof-support plans in its efforts to eliminate human error as a source of roof-fall accidents. Standard plans for roof support require pinpoint supervision by face bosses, if the standards are to be observed day after day. This need for close supervision exists now.

At the same time there is a necessity for each supervisor to learn as much as he can about new roof-control techniques. To be quite frank, we know too little of rock mechanics, which is the science defining the forces resulting in overlying rock strata when supporting coal is disturbed in mining. There is increasing interest in such studies, behooving all of us to keep abreast of the new ideas that are bound to come from these studies while keeping a sharp eye on adherence to standard roof-support plans.

Last but not least, the foreman has similar functions in the area of employee relations. Getting energetic response from the workmen requires that the foreman be competent, judicious, decisive and unflustered. Today's successful foreman possesses enough of the "milk of human kindness" to permit him to understand the values a workman has a right to expect from his job. He tries his best to alleviate the discontent that sometimes exists only in the minds of his men, but he is willing to become their advocate when, in his best judgment, they have a legitimate case of gripes. And he knows the difference.

Tomorrow's successful foreman will have to show all this supervisory competence, plus an increased ability to apply tighter production standards and controls. The tremendous investment in modern equipment for mining and preparation makes it mandatory that this equipment be used to its fullest potential. Better standards of operation are necessary and will be forthcoming. The duty of applying and supervising these standards rests with the immediate production supervisors. There will be new knowledge and skills for the foreman to learn.

The prospect is that these new developments will result in increased strength for the industry as it serves its purpose to the nation. And the good record of the industry will be a reflection of excellent professional supervision from within.

No matter how it's said . . .

by smoke . . . by drum . . . by phone . . .

There's only one final and revealing conclusion:

A FAIRMONT-DESIGNED -BUILT PREPARATION PLANT *Satisfies*

Smoke signal, drum talk or word-of-mouth—news about the high performance of Fairmont preparation plants gets around the industry quickly.

Talk with any operator of a Fairmont cleaning plant and you will find him enthusiastic and "completely sold." He will tell you about the uniformity of *his product* and how his FAIRMONT-erected plant has better than 99% separating efficiency through a size range of from ⅛" to 10" in any tonnage capacity. You soon note his satisfaction hinges on his cleaner and upgraded coal—his increased sales—his improved profits. All due, as he will frankly tell you, to his modern, well-planned Fairmont installation.

Look into the Fairmont story—send us a signal and we'll be there pronto!

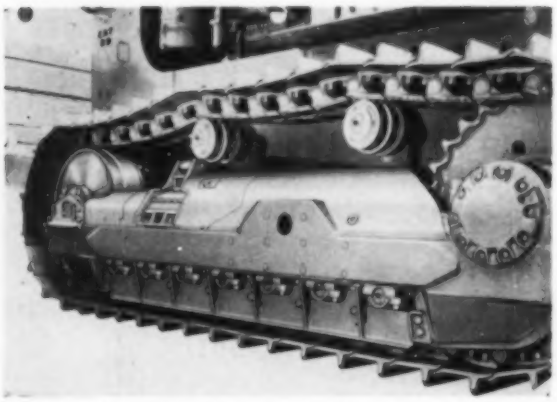
FAIRMONT MACHINERY COMPANY

FAIRMONT, W. VA.

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

COAL AGE

Operating Ideas



DON'T make crushers out of your bulldozers. Use track guards to keep out rock.

Helpful Tips on Operating Bulldozers in Rock

OPERATING CONDITIONS for tractors around stripping operations are severe, and service life of track shoes, rollers, idlers, link pins, bushings and final-drive sprockets is shorter than in earth operations. If you want to get longer life from these parts, check through the following tips, suggested by Caterpillar Tractor Co., on operating tractors in rock work.

Take track shoes, for instance. These are more susceptible to breakage where rock is encountered. Wide tracks have greater overhang beyond the track link, placing more leverage against the outer edges. Hence wide shoes are more frequently damaged while working in rock than narrow shoes. Narrower shoes are therefore best for rock work.

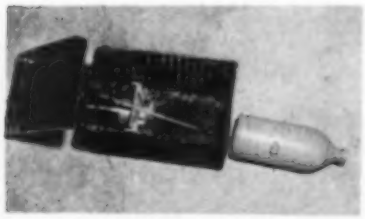
For special conditions, where a tractor works almost exclusively in rock, double-grouser track shoes should be used. Aside from offering better wearing qualities, the second grouser strengthens the shoe longitudinally, providing much greater resistance to bending or cracking under heavy impact in rock work.

On tractors with two-position idlers, adjustment is important to track-shoe service life. Idlers should be kept in the "low" position only when necessary for the type of job at hand.

One attachment that pays for itself many times is the track-roller guard. Field experience with heavy crawler tractors, operating in rock, has proved that track-roller guards effectively protect the component parts of the track and provide maximum service life.

When a tractor works next to a bank or turns in rock, material feeds in between the rollers and the track, and as the tractor moves forward or backward a "rock crushing" action is set up. As the tractor moves backward, rock also feeds in between the idler and the track. As it moves forward, the rock feeds in between the sprocket and the track. All track components are subjected to unnecessary abrasive and impact damage. Track-roller guards will prevent this damage.

Track-roller guards are the best insurance available to provide longer, more economical service life for final drives and all track components of tractors engaged in rock work. Furthermore, these guards help hold the tracks on the rollers in rugged and steep terrain, reducing wear on the roller flanges and idler pilot rim.



THE HARWICK VALVE . . .

HOW it is used.

Plastic Valve Beats Corrosive Water

LONGER LIFE and trouble-free operation are two major benefits resulting from the development of corrosion-resistant sump float valves at the Harwick mine, Duquesne Light Co., Harwick, Pa. The float valves, used on suction lines in small sumps, permit one pump to handle water automatically from a number of sumps. And since the device is resistant to corrosion, little or no maintenance is required other than routine inspections of the sumps and gathering pump by mine personnel.

The present unit was developed from ideas contributed by maintenance men in the Harwick shop. Components of the device are: float, connecting arm, plastic gate valve, ¾-in angle iron, 2-in plastic pipe adapter, lid from electrical junction box and steel housing.

Here is how the valve works. The float is connected to the gate valve by the rod. The float makes the gate move up and down between the angle irons which are secured in front of the 2-in threaded plastic pipe adapter. The pipe adapter in turn is held firmly in the housing by the electric outlet cover. A hole was cut in the outlet cover so the pipe adapter could be threaded into it.

As water flows into the sump, the float rises and slides the plastic cover upward across the plastic pipe adapter. Thus the gathering pump starts to pull water from the sump. As the water is removed, the float falls and finally closes the suction line.

The valve is mounted in a steel housing which has a steel screen on three sides, and a solid top, bottom and back. The top is hinged to permit easy access to the valve and fitted with a handle for easy carrying. The screen serves as a strainer to keep material away from the valve.

To provide protection against corrosion, the non-plastic parts of the unit are painted with Rust-Oleum.

USKORONA SPLICING TAPE

ABOVE...

When you have to make an emergency splice, pick Uskorona.® It's a tape that can handle a wide range of electrical and general purpose jobs. It exceeds A.S.T.M. specifications. It has high dielectric and tensile strength, high elongation and low power factor. It fuses quickly without heat or pressure and makes splices that *last*. A cable becomes as good as new when you use Uskorona. And to complete the splice, U. S. Rubber Uscoprene splicing compound provides an outstanding weather and oil resistant jacket.

A complete line of electrical tape is obtainable at selected distributors or one of our 28 District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y.

In Canada, Dominion Rubber Company, Ltd.

or BELOW!

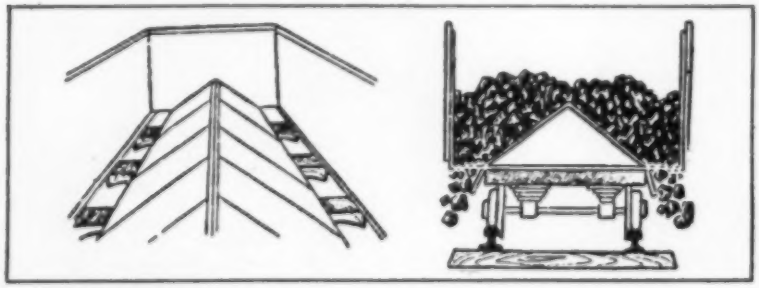
Uskorona Splicing Tape and Uscoprene Splicing Compound restore the original dielectrical and mechanical qualities of the cable.

Mechanical Goods Division

United States Rubber

HORIZONTAL DRILL, mounted on shovel boom, can be raised and leveled to . . .

CONCENTRATE explosive charges closer to hard strata in overburden.



HUNGARIAN side-dumping car employs centerline-hinged floor plates.

Side-Dumping Car

FASTER unloading of coal from railroad cars is said to be possible with a side-dumping railroad car designed at the Ganz factory, Budapest, Hungary. The floor of the car is hinged in the middle and can be raised by hydraulic jacks to discharge coal from the sides of the car. Special steel plates act as guides above the wheels to keep coal away from the tracks.

Drill on Shovel Boom Solves Problem

MOUNTING a horizontal overburden drill on the end of a shovel boom solved a tough drilling problem in the Corbey area of England, according to T. W. Edmond in *Mine & Quarry Engineering*.

Searching for a new method of drilling which would be less costly, quicker, and at the same time permit explosives to break the rock more efficiently, the company decided to try drilling large-diameter horizontal holes in a sandstone immediately under a hard limestone. The limestone lies 15 ft or more above the base of the overburden. The company agreed that a high-speed rotary unit would be best suited for drilling the sand. For the job, a McCarthy drill, manufactured by the Salem Tool Co., was chosen.

The next problem was to mount the drill so that it could work immediately below the limestone. Since the limestone does not maintain a constant level, the mounting had to be capable of considerable vertical adjustment. To get 15 ft or more of adjustment, the company decided to mount the drill on the end of a shovel boom. Here is how the job was handled.

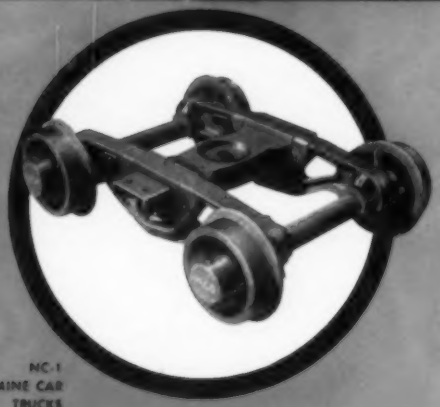
The face end of the drill platform was connected to the end of the boom by a hinged pin. The rear end was supported by a racking arm. To position the drill at the proper level, the end of the boom is moved up or down. Then the platform leveled by moving the racking arm.

The drill itself was mounted on two channels, along each of which a chain was fastened to form a rack. Two pinions, powered from the engine, mesh with the chains and move the unit along to feed the auger forward. Auger sections are 6 ft long, diameter of the cutting bit is 6 in.

Power is supplied by a gasoline engine, which through a reversible gearbox, drives a flexible coupling. Fitted to the end of the coupling is a square pin to which the auger rods are fitted.

Penetration is said to be 6 fpm, and rotation speed can be varied from 15 to 400 rpm, depending on the hardness of the material and the size of the hole.

Are you an idea man? If so, and your idea has been used to make a useful gadget at your mine, Coal Age would like to hear from you. Send a brief description of the gadget to Coal Age, 330 W. 42nd St., New York 36, N. Y. If your idea is published, you will receive a check for $5 or more.



NC-1 MINE CAR TRUCKS

7 years and 460 cars later

Olga Coal Company still 100%

NATIONAL-EQUIPPED

NATIONAL CUSHIONING DEVICES

Photo Enterprise Wheel & Car Corp.

WILLISON AUTOMATIC COUPLERS

In 1951 Olga Coal Company bought 300 coal cars equipped with National NC-1 Trucks, National rubber cushioning devices, Willison Automatic Couplers and Naco Steel Wheels.

Based on experience with the 300 original cars, Olga Coal purchased an *additional* 120 cars. And now Olga Coal has placed a *third* order for 40 more cars. This brings Olga's modern fleet up to 460 units—*all 100% National-equipped.*

This is typical of the swing to National-equipped mine cars—for safety . . . for longer life and lower maintenance . . . for lower per-ton mining costs.

NACO STEEL WHEELS

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY

Established 1868 *Cleveland 6, Ohio*

WILLISON AUTOMATIC COUPLERS • RUBBER CUSHIONED UNITS • NACO STEEL LINKS and SWIVEL HITCHINGS • MINE AND INDUSTRIAL CAR TRUCKS • NACO STEEL WHEELS

CANADIAN SUBSIDIARY *National Malleable and Steel Castings Company of Canada, Ltd. • 128 Simcoe St. • Toronto 1, Ontario*

AA-4879

Lima Type 2400 Electric Dragline, owned by Sullivan Trail Coal Co., Pittston, Pa., at work on stripping operation. Power unit combines an a-c motor with a single-stage torque converter to adapt actual power output to work load demand—at constant motor speed.

LIMA quality means extra production at this 'round-the-clock stripping operation

One of the big stripping operators in the hard coal region is the Sullivan Trail Coal Co., Pittston, Pa. Since its operation is run on a continuous 24-hr. schedule, it demands the utmost in dependability and performance from the Lima draglines and shovels that do the heavy digging.

Sullivan Trail's president, Louis J. Pagnotti, reports: "We want you to know how well pleased we are with the performance of our Lima 2400 and 802 machines. We started buying your Type 2400 Draglines in 1950 and, as you know, we have purchased 11 of them. You will be interested to know that the two Type 2400 Electric Draglines delivered in February and March of 1957 are doing a fine job.

"Our six Lima 802 Shovels are used both for digging rock and loading coal. These shovels are doing a good job, also, and have proved to be a valuable investment.

"I wish to compliment you further on your promptness when an experienced factory service engineer is needed. Good service is extremely important to us, as our machines are used continuously. Waiting for a service engineer can be very costly in idle shovel time and loss of production.

"We are pleased with the many new improvments you have made in the latest Type 2400 Electric Dragline."

There's a Lima for every coal mining job—shovels ½ to 6 cu. yds., cranes to 110 tons, and draglines variable. Ask your nearby Lima distributor for full details or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

Lima Type 802 Shovel, one of six on the same operation.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

BALDWIN BLH LIMA-HAMILTON

585

"I like Bethlehem Track Bolts for three reasons: Sharp, rolled threads. Strong heads and necks. And a variety of sizes."

Spikes and machine bolts, too!

BETHLEHEM STEEL

Every dipper-full weighs 80 tons! The "River Queen", largest power shovel ever to come out of the Bucyrus-Erie shops, can move over 33,000 tons of earth and rock overburden in a single 8-hour day—enough to fill a freight train six miles long. The "River Queen" flies the colors of the River Queen Coal Company near Greenville, Kentucky, a joint strip-mining venture of the W. G. Duncan Coal Company and the Peabody Coal Company and operated by Peabody.

OKOCORD keeps the big ones digging!

She's a big one, all right. Towering as high as a 13-story building, tipping the scales at over twenty-four hundred tons, the "River Queen" is one of the largest pieces of mobile land machinery ever sent into action. And she's powered by a 3-inch, 3/c portable Okocord cable.

She's a hungry one, too! She gobbles up 55 cubic yards of dirt and crushed rock in every bite. She draws 4,160 volts of electricity from her Okocord cable to run the 15 huge electric motors that give her the muscle power to move, wheel and dig.

She needs that power every second—or two and a half million dollars worth of equipment is immobilized. That's why Okocord trailing cable was selected to stand up to constant reeling and unreeling . . . to twisting and scraping as it's dragged over rocky ground . . . to being left for days on end in water and muck.

You should know about Okocord, too, whether you operate the world's largest power shovel or a simple portable drill. It's so easy—just write for Bulletin CA-1108, The Okonite Company, Passaic, N. J.

where there's electrical power... there's **OKONITE CABLE**

5476

Meet the Press in a
GUNDLACH CRUSHER

Meet the press of today's market where absolute control of top size is essential

The Gundlach two-stage double adjustable crusher is designed to meet the exacting demands of today's market in that it is capable of crushing to any desired top size from ½" to 6". The resultant crushed product is uniform in size, with definite control of top size, and has a smaller percentage of fines than any other crusher on the market.

Primary and secondary crushing in one operation eliminates additional crushing and conveying equipment. Compactness in design saves valuable installation space. Quality controlled production eliminates unnecessary use of horsepower.

Both upper and lower rolls are adjustable by mere turn of hand wheel (even while crusher is in operation), to compensate for variance in size of feed and desired size of end product. Product to be crushed is fed to crusher where the heavy hook-design tooth-studded upper rolls perform the primary crushing operation. Simultaneously the patented pocket-tooth designed lower rolls grab and reduce the pre-crushed product to the desired top size with a minimum of grinding action.

T. J. GUNDLACH MACHINE CO.

DIVISION OF [illegible]

P.O. Box 283 • Belleville, Illinois

WEMCO FLOTATION FOR FINE COAL CLEANING

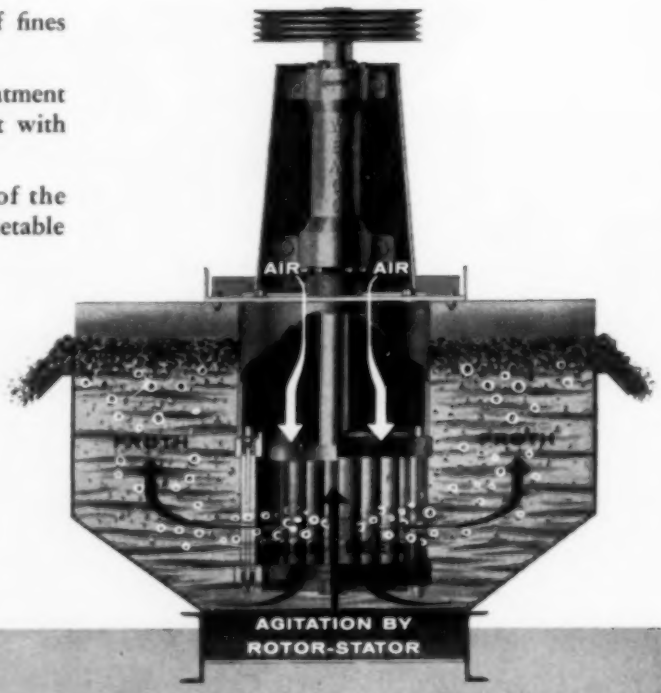
"COAL ENGINEERED" FOR MAXIMUM TONNAGE AT MINIMUM COST

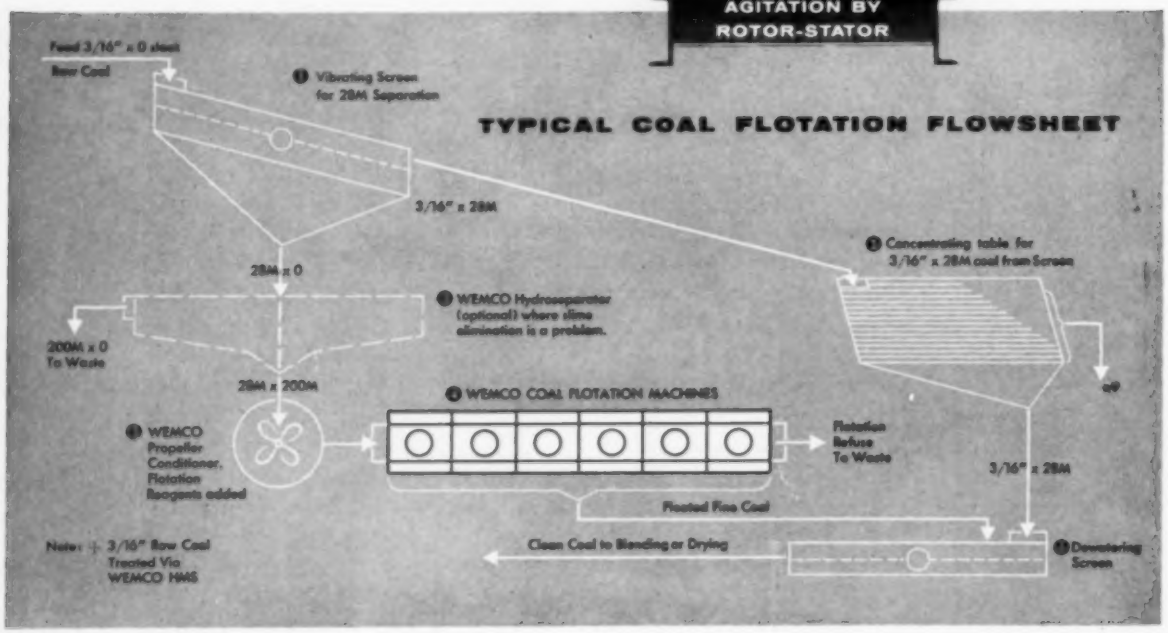
Size Range—cleaning and up-grading of fines from -28 mesh to 0.

High Efficiency—High capacity in the treatment of fine coal . . . produce saleable product with minimum ash content.

Greater Economy—superior aeration of the Wemco cell floats a larger tonnage of marketable fine coal.

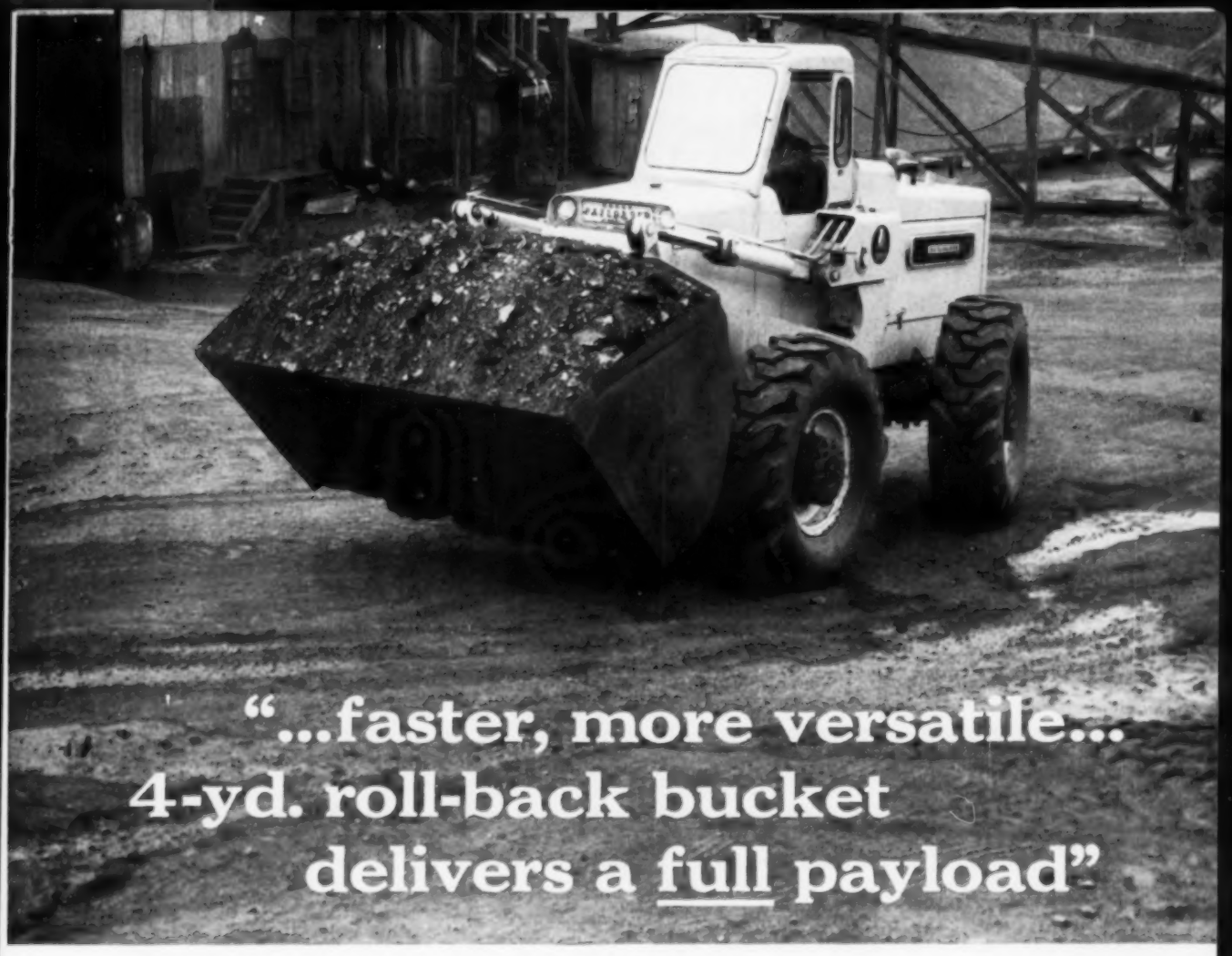
Advance Proof of Performance—consultation with a Wemco Application Engineer is available at your request...learn how use of Wemco Flotation can result in greater profits to you. No matter what your coal cleaning problem, it will pay you to investigate Wemco designed circuits and equipment.




TYPICAL COAL FLOTATION FLOWSHEET
Feed 3/16" x 0 stock
Raw Coal
1 Vibrating Screen for 28M Separation
3/16" x 28M
28M x 0
200M x 0 To Waste
2 WEMCO Hydroseparator (optional) where slime elimination is a problem.
3 Concentrating table for 3/16" x 28M coal from Screen
28M x 200M
4 WEMCO COAL FLOTATION MACHINES
1 WEMCO Propeller Conditioner, Flotation Reagents added
Flotation Refuse To Waste
3/16" x 28M
Floated Fine Coal
Note: + 3/16" Raw Coal Treated Via WEMCO HMS
Clean Coal to Blending or Drying
5 Dewatering Screen

WESTERN MACHINERY COMPANY • 650 FIFTH STREET • SAN FRANCISCO 7, CALIF.

NEW YORK • CHICAGO • LOS ANGELES • SALT LAKE CITY • SPOKANE • DENVER • GRAND JUNCTION • PHOENIX • HIBBING • TORONTO



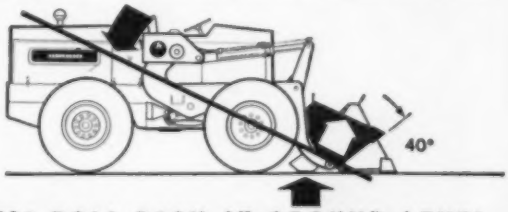
loads trucks... delivers coal to tipple... reclaims slush coal... does general maintenance

Legal Coal Company of Goodspring, Pa., replaced another rubber-tired tractor-shovel with this big model HO "PAYLOADER" with a 4 cu. yd. bucket in order to obtain more production, faster travel and greater lift capacity.

The diesel powered "PAYLOADER" is working out very satisfactorily, according to Henry L. Golden, partner in this anthracite coal operation. "It's faster and more versatile," he says, and "the 4 cu. yd. roll-back bucket delivers a full payload with speed and safety. It's also doing jobs about the tipple operation previously done with crawlers."

While the HO was bought principally for stockpile load-out work and plant maintenance, Legal Coal is getting *added work capacity* from their 4-wheel-drive "PAYLOADER" . . . it can load out slush coal reclaimings at the tipple, a job that always called for a dozer because of soft footing conditions. However, the HO is doing a perfect job and will be used on this operation entirely in the future.

You'll never know how much *added work capacity* a 4-wheel-drive "PAYLOADER" can give your mining operation until you see one in action. Check the size you need on the coupon to the right and, without obligation, your "PAYLOADER" Distributor will demonstrate it *on your work.*



40° ROLL-BACK AT GROUND LEVEL produces a tremendous pry-out force by using break-out pads at bottom of lifting arms as ground support or fulcrum . . . keeps bucket close to machine for maximum stability and carry capacity.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

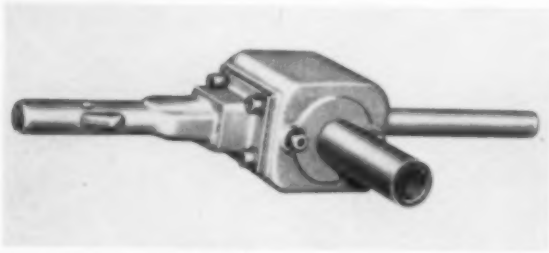
THE FRANK G. HOUGH CO.
735 Sunnyside Ave., Libertyville, Ill.

Send more data on the 4-wheel-drive "PAYLOADER" tractor-shovel checked:

- ☐ HO — 9,000 lb. carry cap. (1 to 4 cu. yd. buckets)
- ☐ HH — 7,000 lb. carry cap. (⅞ to 3¼ cu. yd. buckets)
- ☐ HU — 5,000 lb. carry cap. (¾ to 2½ cu. yd. buckets)

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____
1-8-7

Equipment Developments



One-Man Drill

So light that one man can do the work of two—this is how Long Co., Oak Hill, W. Va., describes Models 1-M-20 and 1-M-30 hydraulic coal drills. Reduced in weight by aluminum construction, the drills operate at high horsepower ratings and pressures of 2,000 psi. This is accomplished by new design principles, not incorporated in heavy mounted drills, according to the company. In this new design, the electric motor operates and oil circulates only when the auger is rotating, and the independent hydraulic power unit prevents tampering with relief settings. The 1-M-20 (weighing 20 lb) is designed for drilling all powder holes, while the 30-lb Model 1-M-30 is particularly applicable for Airdox and Cardox holes. Long Co. hydraulic drills are furnished with their own self-tramming power unit or with a skid-mounted power unit which can be mounted on "T" trucks and mobile cutting machines.

Film-Forming Reagent

A reagent which forms protective crusts on exposed coal and mineral fines is newly announced by American Cyanamid Co., New York 20, N. Y. The company feels that the special chemical, a water emulsion of a synthetic resin, will be useful in preventing wind and rain erosion during shipment in open cars or open storage in stockpiles. It is speculated, for example, that in a 400-mi haul, fine anthracite produced by froth flotation and shipped in open hopper cars, may be blown off to the extent of as much as 4 tons of coal per car, representing over $20 worth of coal. Reagent S-3152 would practically eliminate the loss, says American Cyanamid. The reagent, described as neither corrosive nor harmful to the skin, could be sprayed on by a small pump. After spraying, the resin sets up or polymerizes around the solid particles in the wetted surface and forms a crust. This takes about 6 hr. The crust which forms is tough enough to resist peeling off by wind, but in the case of railroad cars, may not be tough enough for the train crew to walk over.

Long-Boom Loader

Dumping clearances of 15⅝ ft under the hinge pin, and 11½ ft under the bucket cutting edge, are now obtainable on the 2-cu-yd TL-20D "Tractoloader," through the use of a special long boom arrangement, according to the manufacturer, Tractomotive Corp., Deerfield, Ill. Recommended for use in material weighing up to 2,700 lb per cu yd, the unit has all the features of standard models, says the company. Those stressed include: single-lever speed and directional control of the power-shift transmission, torque converter, planetary axles pin-connected to the frame, power steering, power brakes and 24-V electrical system.

Efficient Rotary Compressor

30% greater operating efficiency and less than 50% as many working parts as other current models, are points which Davey Compressor Co., Kent, Ohio, stress about their new 600-cfm rotary compressor. Known as "Hydrovane," the unit is also

B.F.Goodrich

How Eagle-Picher gets 2 to 3 retreads from B.F.Goodrich all-nylon tires

THE EAGLE-PICHER COMPANY mines and processes lead and zinc ore in northeastern Oklahoma. Inside the mine, dump trucks haul 9.5-ton loads, trailers haul 15-ton loads. Diesels used for outside hauling average 15¾ tons per load. Eagle-Picher used B.F.Goodrich *all-nylon* tires for all these jobs.

The B.F.Goodrich Rock Logger tires above and Universal tires (below left) work inside the mine on a bed of slippery flint rock, yet carry over 3,500 tons a month and give 18 months' service before retreading. Traction Express tires (below right) cover up to 4,000 miles a month on gravel roads. In spite of this rugged work, Eagle-Picher gets as many as 3 retreads from B.F.Goodrich tires!

The B.F.Goodrich *all-nylon* cord body is stronger than ordinary cord materials, withstands double the impact and resists heat blowouts and flex breaks. That's why the B.F.Goodrich *all-nylon* cord body outwears even the extra-thick tread, *can be retreaded over and over!* You get more hours of tire service at lower cost per hour.

Your B.F.Goodrich dealer has a tire for every kind of mining work. Ask him to show you the tires that will save you money or write: *B.F.Goodrich Tire Company, A Division of The B.F.Goodrich Company, Akron 18, Ohio.*

THESE UNIVERSAL tires carry 15-ton loads, often make over 250 trips a month on slippery, razor-sharp flint rock.

ALL-NYLON Traction Express tires work 48 hours a week hauling ore from Eagle-Picher mine. Company uses 3 types of BFG tires.

Specify B.F.Goodrich tires when ordering new equipment

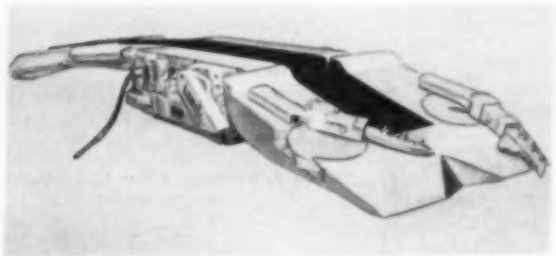
B.F.Goodrich
FIRST IN RUBBER

Your B.F.Goodrich dealer is listed under Tires in the Yellow Pages of your phone book

declared to be the only multi-stage rotary compressor with a single free-floating rotor. The latter is so located that it is constantly concentric with one side only of the stator. Its blades are of the segmented type, inserted radially in longitudinal slots. They move continuously in a straight line from the stator center and cannot "cock" or bind. Other new features include both primary and secondary intake air cleaners, three-stage oil separator and single-adjustment vacuum-hydraulic, supply-demand control. All parts are available for inspection or service through a removable end panel and side panels. According to the manufacturer, no special tools are required for servicing.

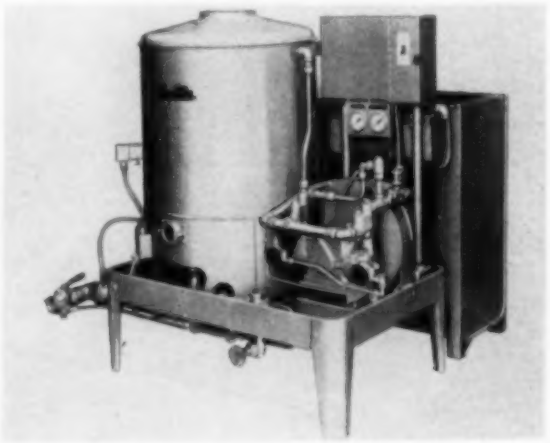
Aluminum Rock Body

Designed to increase payloads, and reduce tire wear and gasoline consumption, a new aluminum alloy rock body, which can be mounted on special off-highway trucks, is out from Heil Co., Milwaukee 1, Wis. The bodies are fabricated entirely from special aluminum plate instead of steel which is generally used for bodies of this type. Points stressed about the set-up by Heil Co. are: all-welded construction, high capacity (about 36 cu yd, heaped), all interior corners rounded to prevent adhesion of sticky material and heated floor construction. It is felt that due to the lighter weight of the rock body, greater speed in loading and carrying will make it possible for fewer units to haul just as many loads as a larger truck fleet using conventional rock bodies.



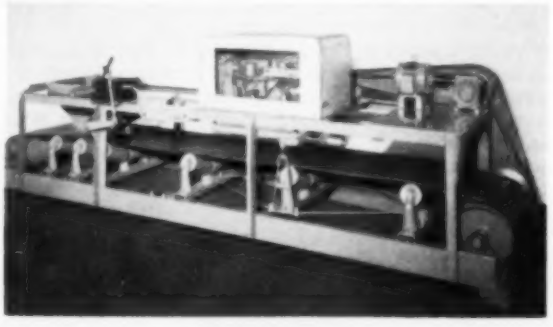
Better Loading Unit

A new loading machine designed by Long Co., Oak Hill, W. Va., is essentially an improved version of the Pigloader 188. Besides a low operating height of 25¾ in, the machine features simplified design utilizing fewer parts and full independent crawler control. A single 40-hp electric motor drives all machine operations, and gives the unit maximum tramming and digging power, according to the firm. It is also declared that maintenance on Model 188-C is much simpler and easier to perform than with multi-motor designs. It has a rated capacity of 4 to 6 tph and a tramming speed of 95 fpm.



Powerful Steam Cleaner

A new steam cleaner, designated the 280 "Blast-Master", is announced by Clayton Mfg. Co., El Monte, Cal. The machine, according to the manufacturer, is the world's most versatile steam cleaner, delivering all or any part of a full 280 gph of balanced cleaning solution. Completely self-contained and fully automatic, this new model, it is stated, is designed specifically for heavy-equipment distributors and operators, contractors, and plant and field operations. For the first time, claims Clayton Co., here is a steam cleaner that is equally effective for light, medium, heavy or extra-heavy cleaning. "Flexiматic Control" is said to give the cleaner great versatility, featuring automatically-regulated fuel delivery to the burner, permitting the operator to select and use all or any part of the 280 gph capacity from one or even two guns.

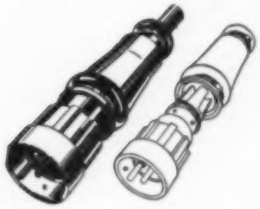


Accurate Continuous Feeder

Accuracy and continuous operation are main characteristics held out to users of a continuous-weighing belt-scale feeder, designed by ABC Scale Div., McDowell Co., Inc., Cleveland 10, Ohio. The unit, which blends and controls the flow of bulk materials, is said to maintain feed accuracy to within 1% of a present rate. It is shipped as a complete package installation, ready to bolt into the conveyor line. Built from standard component parts, it consists of a powered conveyor section, mounted on a jig-welded structural steel frame.

THIS CONNECTOR HAS TO BE *Tough!*

STRAIGHT PIN BIGUN (**SPB**) styles are molded to 36" (Or as specified) leads. Have threaded metal couplings. Ask for Bulletin B39a.



"QUIK-LOC" styles attach quickly to your cable. New-type couplings engage or disengage in ¼ turn. Ask for Bulletin B57.

IT IS! It's a Joy Connector . . . a non-corrodible, moisture-tight electrical coupling with a rugged coat of flame-resistant, shatter-proof, distortion-resistant Neoprene. Soak it in water, hit it with a sledge, drag it through oil . . . it'll take that and more.

Joy plugs and receptacles are built for long, maintenance-free service under the most adverse conditions. They're produced in styles and sizes to meet every need . . . for both AC and DC applications. "SPB" and "Quik-Loc" designs are available with pilot control contacts for *permissible operation* with Joy's Bureau-of-Mines-Approved distribution centers (SCC units).

For details, write *Joy Manufacturing Company, Electrical Products Division, 1201 Macklind Avenue, St. Louis 10, Missouri.* Executive Offices: *Oliver Building, Pittsburgh 22, Pennsylvania.*

JOY . . . EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY

OTHER PRODUCTS of the ELECTRICAL PRODUCTS DIVISION

Safety Circuit Centers

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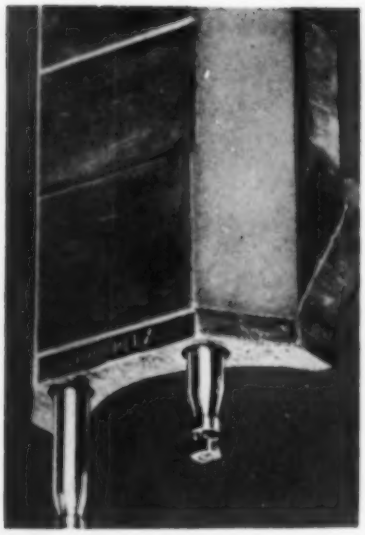
Portable Lighting

Cable Vulcanizers



Heat Warner

A warning system based upon a compound emitting billows of white smoke and a peculiarly distinct odor is insurance against heating up, available from Humphrey-Wilkinson, Inc., North Haven, Conn. The firm claims that their warners can be used in the most inaccessible places, providing an inexpensive means of alarm without maintenance. For example, if heat exceeds 450 F in grease-lubricated solid bearings, the cartridge-shaped warner in dicates overheating. The alarm is triggered at 255 F if overheating develops in railroad roller bearings. The company states that it has developed the sealed brass cartridges in various shapes and sizes to suit application needs.

Electric Etcher

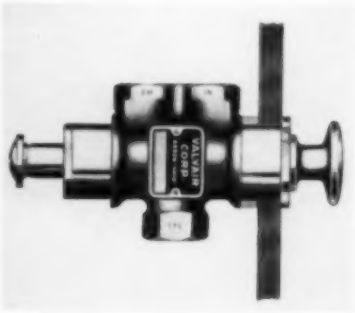
An electric etcher, which has 14 heats up to 1,350 w, and which permanently marks iron or steel, is available from Martindale Electric Co., Cleveland 7, Ohio. Hand tools, steel castings and a wide variety of iron and steel parts can be marked easily for identification, according to the firm. Two straight writing tips are furnished: one copper and one tungsten tipped. The etcher, designed for ease in writing at varied speeds and depth of marking, comes with a heavy-gage steel carrying case which provides protection and storage space for accessories.

New Scraper

An 18-cu-yd scraper to be coupled with tractors of 90 hp or more is a recent design of LeTourneau-Westinghouse Co., Peoria, Ill. It falls in line as a companion unit to the big 27-cu-yd scraper introduced earlier this year. Both models are four-wheel versions of the Fullpak design pioneered in the firm's B and C Tournapull scrapers. The newest model features a clean, smooth bowl interior for minimum resistance in loading and unloading. The bowl floor, which provides more than 46¼ sq ft of load base, measures only 59 in from the tip edge of the cutting blade to the face of the tailgate, according to the firm.

Hydraulic Circuit Tester

A portable hydraulic-circuit tester, which is described by its manufacturer as ideal for use on hydraulic construction and earth moving equipment, is available from Schroeder Bros. Corp., McKees Rocks, Pa. Model PT-100-B weighs 19 lb and is therefore easy to carry to the place of need. It can be connected in a matter of minutes by hose, and accurately measures temperature, volume and pressure, rapidly pinpointing faulty hydraulic pumps, valves or circuits, states the firm.



Panel-Mounted Valves

Leak-free construction, unrestricted flow capacity, simplified mounting and safer operation are attributes of knob-controlled, panel-mounted valves turned out by Valvair Corp., Akron 11, Ohio. These valves for up to 200-psi pneumatic and hydraulic or vacuum service, are precision-cast and hard chrome-plated stainless steel, making them really good at withstanding heat and hydraulic fluids, according to the firm. Flow area through the valve is said to be equal to nominal pipe size, accounting for unrestricted flow.

Wire Stripper

A thumb-operated gage makes it easy to use a new wire stripper No. 299, designed by Proto Tool Co., Los Angeles, Cal. The 5-in tool strips all commonly used insulated wire from 14 to 24 gage without nicking or cutting, according to the firm. The star gage, which is simply turned to the desired notch opening size, makes operation fast, says the organization, and plastic grips lessen fatigue and increase user comfort.

Light Diamond Drill

A diamond drill, weighing 37 lb and having depth capacities up to 200 ft is newly produced by Wink Corp., Milwaukee 13, Wis. The manufacturer says that the drill, which has rated capacities for core diameters up to 6 in, consumes low amounts of gasoline neighboring 2

Lifting heavy beams for steel-skeletoned skyscrapers, over the heads of pedestrian and vehicular traffic, calls for careful loading — with safe slings, stout wire rope and a crane that's securely guyed with steel cables. Structural steelworkers practice safety because they know that...

life depends on it

Today, taller buildings, bigger bridges, deeper oil wells, greater construction projects require stronger, safer wire rope. And equipment operators know that when you buy "bargain" rope you're heading for headaches, trouble and expense. So don't bargain with safety. Buy wire rope on the basis of *quality*. Buy Wickwire Rope.

WICKWIRE ROPE — A CF&I PRODUCT

CF&I

LOOK FOR THE YELLOW TRIANGLE

5696

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

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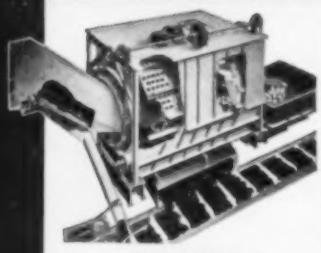
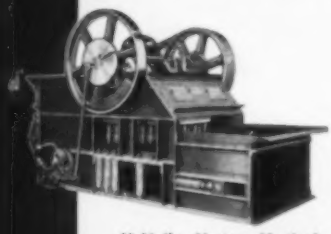
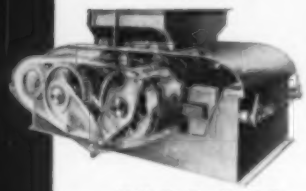
America's most complete line of CRUSHING EQUIPMENT



McNally Pittsburg Rotary Breaker
This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker
50% Less fines when reducing lump to egg and stove sizes.



McNally Double Roll Gearmatic ROM Breaker
Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher
This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

McNally Single Roll Crusher
Universal application 20", 24" and 36" diameter rolls.

AVAILABLE
From Stock and on Short Delivery
For immediate action on complete information write, wire, or call.

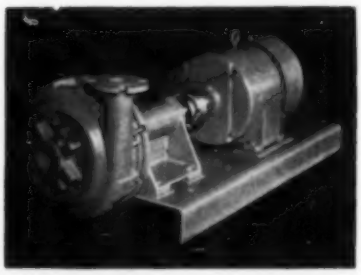
McNALLY PITTSBURG MFG. CORP.
Pittsburg, Kansas Wellston, Ohio

Equipment News (*Continued*)

gal per shift and as little as 1½ gal of water per foot of drilling. An overhead drive principle allows up to 10-ft strokes without rechucking the drill rod. Engineering features include a water-cooled gear box, safety clutch, built-in water swivel and convenient bullseye level.

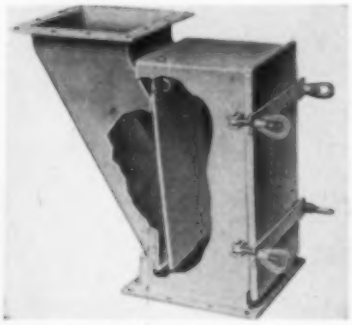
Self-Priming Pump

A contractors' pump which weighs only 45 lb due to aluminum construction is announced by Worthington Corp., Harrison, N. J. It is an engine-driven centrifugal pump, which features an exclusive recirculation port design, eliminating valves and permitting renewal of internal clearance, according to the company. The firm also says that the self-priming pump will give durable service despite lightweight construction because all parts subject to wear are made of cast iron and steel.



Slurry Pump

Simplicity of design and structural strength are the selling points attributed to their new medium-range, high-speed slurry pump by Morris Machine Works, Baldwinsville, N. Y. The pump is said to be excellent in industries where both abrasion-resistance and high speed are desired and is specifically designated for handling suspensions of sand, coal, crystals, silt, sludge or chemical process slurries. It has a renewable suction liner and semi-open impeller, and is obtainable in cast iron, Ni-hard or stainless steel.



Trickle Valve

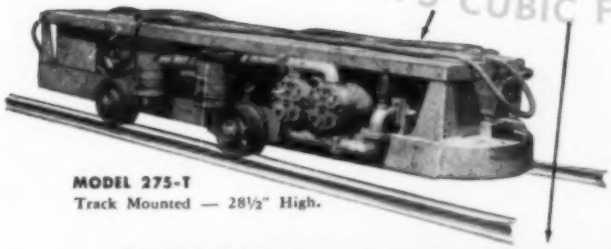
Trouble-free performance under severe conditions of temperature is promised of Model FA trickle valve by Ducon Co., Inc., Mineola, N. Y. The valve, declares the firm, provides continuous discharge of dust from cyclones and other dry-dust collectors, while maintaining a positive gas seal. A front-access door allows periodic inspection and observation of the valve which is said to be resistant to severe corrosive and abrasive conditions. It is suitable

ACME MINE COMPRESSORS–

Rugged • Dependable • Maneuverable • Self-Contained

...and VERSATILE

275 CUBIC FEET OF AIR



MODEL 275-T
Track Mounted — 28½" High.

MODEL 275-S
Low Coal Special — 29" overall — Less if it is to be mounted in a carrier.

MODEL 275-SPRHS
Rubber Mounted — Self Propelled. Two stoper Jumbo Arms with stopers and dust collectors — 34½" high with 9" ground clearance.

MODEL 275-TD
Track Mounted — 2 Drifter Jumbo Arms and Heavy Duty Drills for Rock Work. Arms may be interchanged with stoper Jumbo Arms.

One of these machines will fit YOUR mine conditions.
Variations such as with or without cable reels, variable ground clearance, seats, etc. are available. Full hydraulic drive and steering. Parking and tramming brakes.

Write or call us and let us quote on your requirements —
We will be glad to demonstrate in YOUR mine.

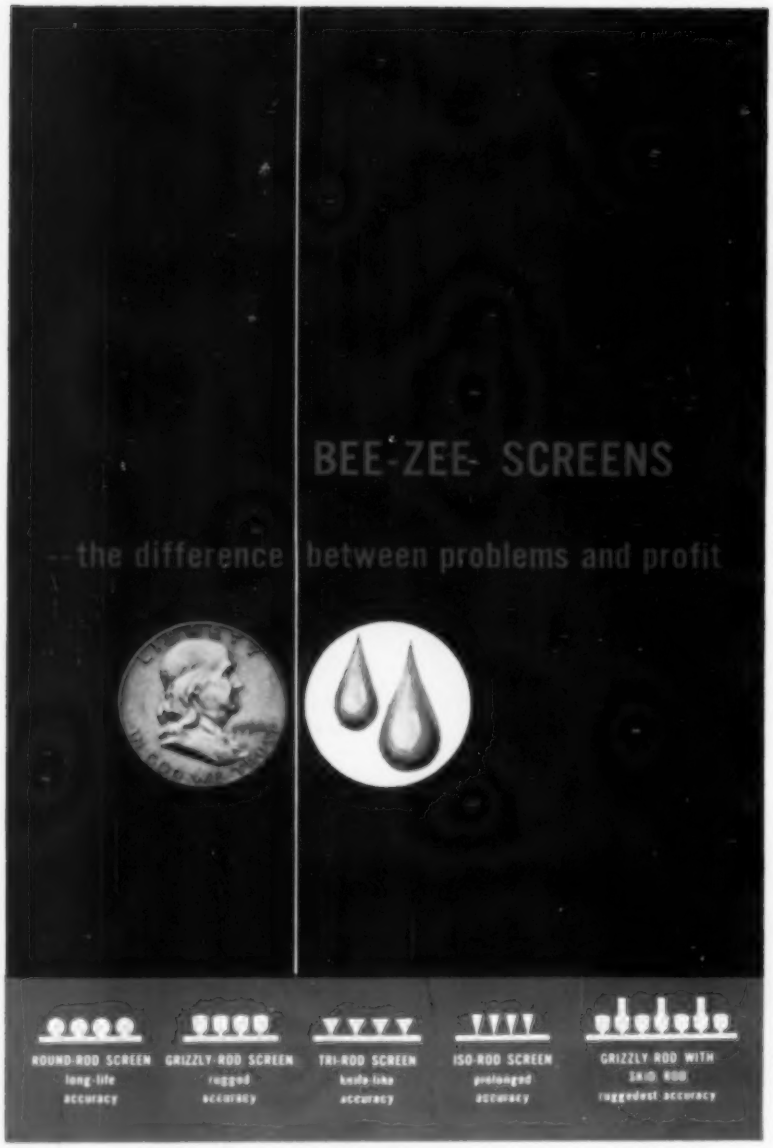
ACME MACHINERY COMPANY

ACME MACHINERY COMPANY

WILLIAMSON, WEST VIRGINIA

WAREHOUSE AND SALES OFFICE
MORGANTOWN, W. VA.

REPRESENTATIVES IN PRINCIPAL MINING AREAS



When volume of production or quality of product is bottlenecked by a screening problem, find out how Bee-Zee Screens can make a difference! You can retain high Btu-content, dewater, size and heat-dry coal fast and efficiently with these welded stainless steel Bee-Zee Screens. Specially shaped rods are precision-spaced by electronic control – in screen size, type and dimensions tailored to your specific equipment and requirements.

Sizing, dewatering, drying, filtering – on any screening job Bee-Zee Screens solve problems to make you money. See your screening equipment manufacturer–or write, wire or phone Galesburg 4397 collect for complete facts.

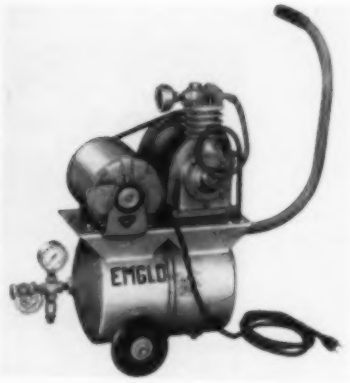
BIXBY-ZIMMER
ENGINEERING COMPANY
118 Abingdon Street, Galesburg, Illinois

Equipment News *(Continued)*

for all free-flowing materials with a specific gravity of 2 or higher.

Drafting Machine

A portable drafting machine that folds up to fit in your pocket or briefcase is offered by David Miller & Associates, Beverly Hills, Cal. Named "Draftette," the instrument is available attached to a portable drawing board that will also fit easily into a briefcase. Made of aluminum, the handy little tool is sufficiently versatile, says its manufacturer, to replace T-square, ruler, protractor and triangles. The price runs from $5.95 to $18.95 depending on drawing board size.

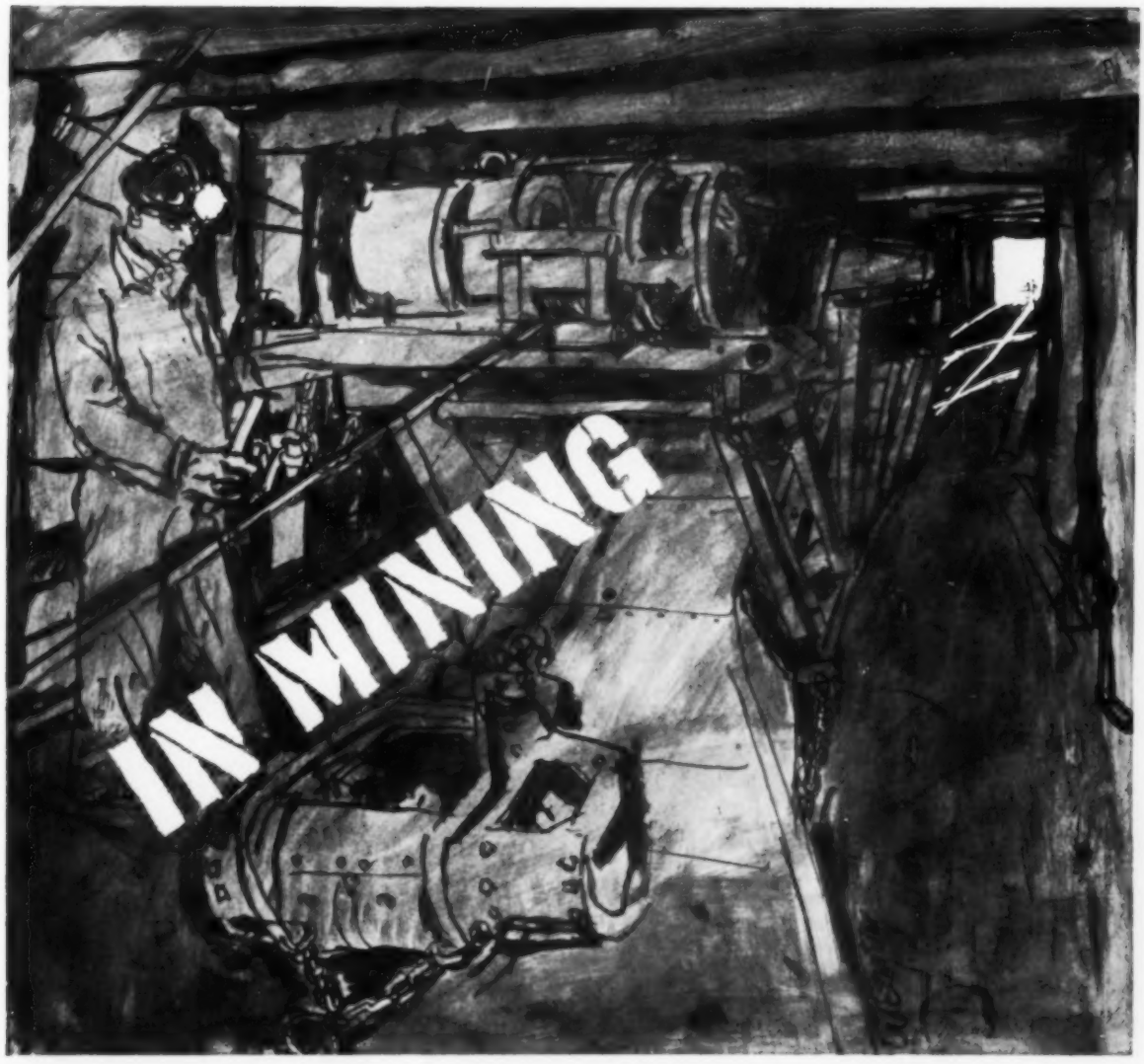


Portable Compressor

A small portable air-compressor mounted on a 3-gal tank, and which can produce 100 psi, is presented by Emglo Products Corp., Johnstown, Pa. The single-cylinder piston-type compressor, driven by a 1/3-hp motor, could be useful in such applications as tire inflation, paint spraying, cleaning, operation of air-driven tools and cylinders. It comes with a 2-wheel portable mounting, push handle, 8-ft cord, pressure gage, relief valve, shut-off valve and drain valve. List price is $110.

Portable Belt Conveyor

A tubular-frame portable conveyor designed by E. F. Marsh Engineering Co., St. Louis, Mo., features push-button



NOTHING **TRANSMITS POWER** WITH THE **FLEXIBILITY** OF ROEBLING ROYAL BLUE WIRE ROPE. This, and its exceptional resistance to abrasion, shock and corrosion attack, make Royal Blue the strongest and safest wire rope you've ever used. On any comparative cost basis, nothing matches it as an instrument for transmitting power. For details on the real meaning of long service life, contact your nearby Roebling Distributor, or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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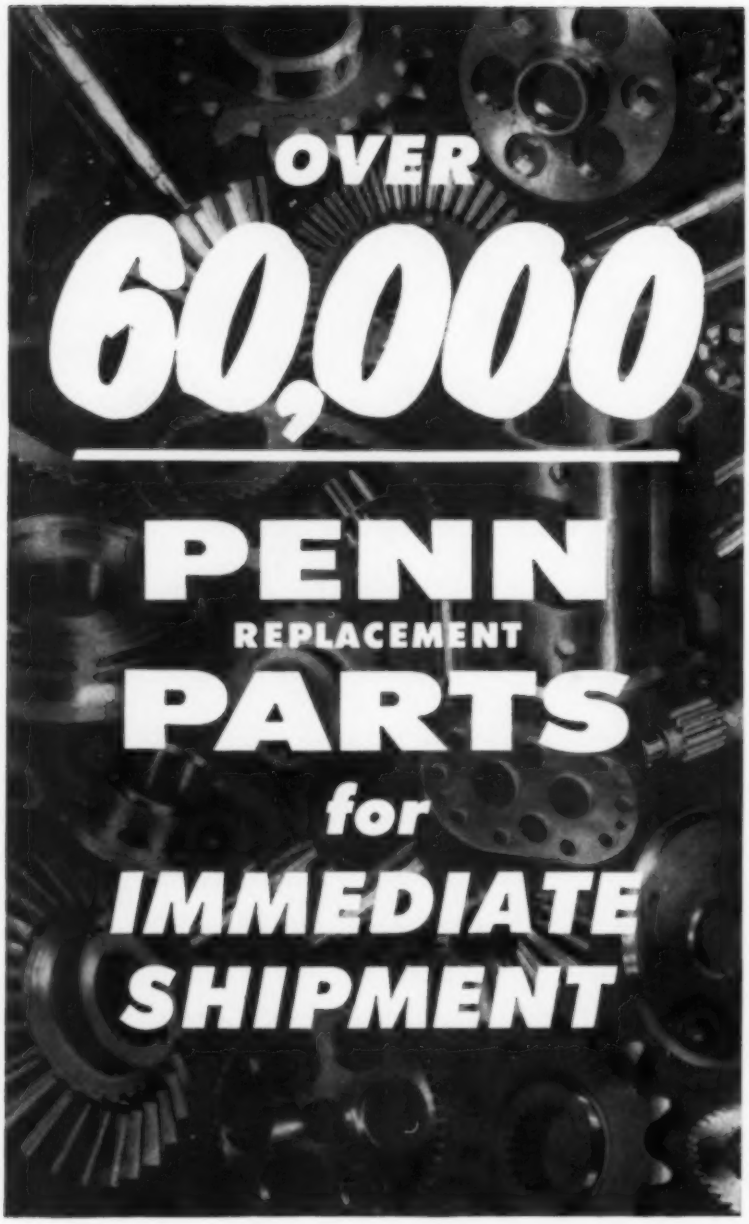
DESIGN
FOR WIRE ROPE
Its ready adaptability is evident wherever power is transmitted. It conforms to unique design requirements. Use wire rope to transmit power.



Our large inventory enables us to promptly fill your requirements for dependable, accurate and quality replacement parts for all types of mining machinery. Call, write or wire us for parts you need in a hurry.

Write today for brochure

PENN MACHINE CO.

JOHNSTOWN, PA.

Union Trust Bldg., Pittsburgh, Pa.

Mt. Hope, W. Va. Huntington, W. Va.

Equipment News (*Continued*)

control of a hydraulic transmission system. The hydraulic system is used to drive the conveyor belt as well as raise and lower the conveyor to the desired elevation. The new conveyor drive is designed to reduce maintenance by eliminating universal-shaft and roller-chain drives. 18-, 24- or 30-in belt widths are available in lengths that range from 30 to 50 ft in 5-ft increments. The unit is equipped with pneumatic-tired swivel wheels, standard loading hopper, head-pulley lagging, belt wiper and tow hitch.

Depth Gage

A precision instrument, designed to measure the tread depth of tires used on trucks and off-the-road equipment, has been developed by Dill Mfg. Co., Cleveland, Ohio. Known as Model 5096, the gage is said to be especially valuable for proper maintenance of tires. In addition, it provides a means for gaging treads when mating dual tires. Also stressed is its ability to instantly measure remaining life of a tire, providing an important safety check. The instrumem is graduated in 1/16-in increments up to 5 in. It is all-metal construction, with a pocket clip on the case for ease of carrying on the job.

New Gearing Line

A new group of helical-gear, speed-reducing apparatuses, with double-

IN THIN SEAMS ONLY THE

Compton "Twin Head"

GIVES YOU . . .

8% More Coal Recovery

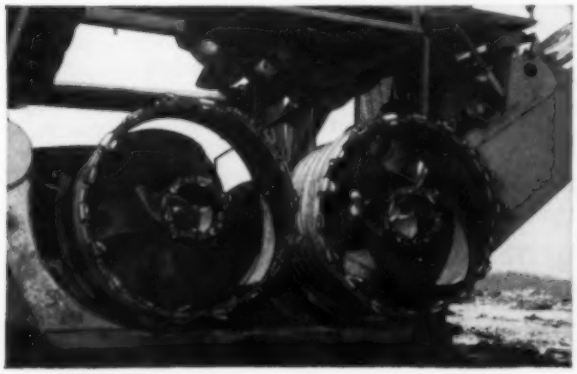
than from any other auger

High Hourly Production

- 65 T. P. H. in 30" coal
- 85 T. P. H. in 38" coal

Reports from operators prove the efficiency of the "TWIN HEAD" auger in recovering coal from seams so thin that, until the advent of the "TWIN HEAD," they were not suitable nor profitable for auger or deep mining.

The twin heads, revolving in unison, auger a single twin hole or, where seam thickness permits, will drill double vertical overlapping twin holes to a depth of 150 feet.



Contact Compton for your auger requirements and a free appraisal of your property for the proper auger application.

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

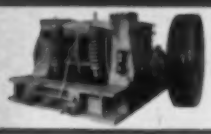
CLARKSBURG, W. VA.

WHEN LOOKING FOR AUGERS—LOOK TO
COMPTON

McLANAHAN SINCE 1835

CRUSHERS for COAL and REFUSE

SINGLE ROLL



Rockmaster — High in capacity and ruggedly constructed, it crushes hardest rock, slate and similar mine refuse.

Super Black Diamond — An all-steel, intermediate-duty crusher, this provides many Rockmaster features at moderate cost.

Black Diamond — Steelstrut Toggle protection against uncrushable materials and quick size adjustment are features of this fabricated steel crusher.

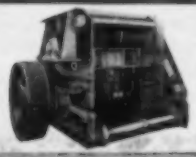
Bantam Buster — This is a portable, low-cost unit with a high ratio of reduction. Trouble-free maintenance is a feature.

DOUBLE ROLL

Black Diamond Double Roll — This was designed for moderate to fine reduction of coal where a low ratio of reduction is satisfactory.

Heavy-Duty Double Roll — Economical and noted for service, it is ideal for fine reduction of mine refuse.

TRIPLE ROLL



Black Diamond Triple Roll — Radically new 2-stage design reduces run-of-mine and direct open pit feed coal to fine sizes.

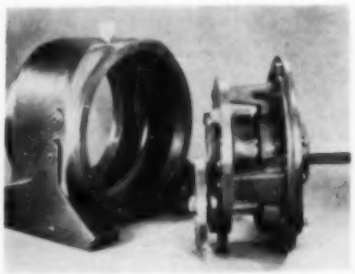
Bulletins Available on All Crushers

McLanahan and Stone Corporation

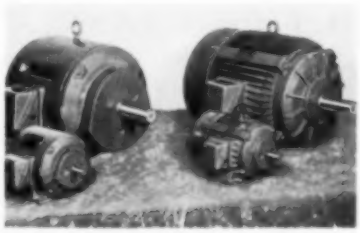
250 Wall Street, . . . HOLLIDAYSBURG, PA.

Mine, Pit and Quarry Headquarters Since 1835

Equipment News *(Continued)*



reduction cages and fixed 5:1 set of low-speed gears is out from Westinghouse Electric Corp., Pittsburgh, Pa. Named "Moduline," basic subassemblies and accessories are combined to make any helical gear-drive configuration. Spinflame, heat-treated, high-speed change gears are mounted on rolled spline shafts so that they can be mounted or replaced with common hand tools, says the company. A total of seven unit sizes to 30 hp are available with ratios of 5:1 up to 625:1. It is stated that every unit has overhung load capacity in excess of any loads expected in service when using sprockets, pinions or pulleys for power take-off.



Protected Motors

A line of protected, series "D" AC motors in new, large NEMA frames is introduced by Reliance Electric & Engineering Co., Cleveland, Ohio. They are said to be totally enclosed and protected, fan-cooled, corrosion and explosion proof. The new motors complement the present line of Reliance motors, which feature such items as "Metermatic" lubrication, special insulation system and a neoprene gasket to protect motor leads.

Vibrating Feeder

The latest development from Hewitt-Robins, Inc., Stamford, Conn., is a heavy-duty vibrating feeder, built to handle ore, coal, rock and other bulk materials in lump sizes up to 4 ft in diameter at a rate of 300 to 3,000 tph. The new machine, it is advertised, is designed for economical operation where difficult conditions are encountered, such as large lumps and heavy impact loading, severe abrasion, unusually sticky material or heavy surge loads. The

30-inch neoprene belt in mine's B-3 section carries coal 1600 feet from face area to car-loading point.

Barnes & Tucker use neoprene to modernize Springfield No. 4 Mine

Neoprene belting is playing an important part in the modernizing program under way at the Springfield No. 4 Mine near Spangler, Pa. Operated by Barnes & Tucker, Inc., the mine produces 1500 tons per day from a 38-inch seam. Plans for further production increases include conversion to an all-belt coal removal system. 6000 feet of neoprene belting are currently in service. When the change-over is completed, approximately 15,000 feet will be in use.

Neoprene-covered belting provides true long-term economy. Neoprene has excellent resistance to cutting, tearing, abrasion . . . offers lasting protection against the deteriorating effects of acid water, mildew, lubricants. Neoprene's resistance to aging and, above ground, to sunlight and weather also add to belt life. Finally, neoprene's fire resistance provides an extra safety factor. Neoprene will not support combustion.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its combination of properties means long-term economy and safety. We would like to tell you more about neoprene. A request will put your name on our mailing list for regular, free copies of the Elastomers Notebook. Just write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. CO-1, Wilmington 98, Delaware.

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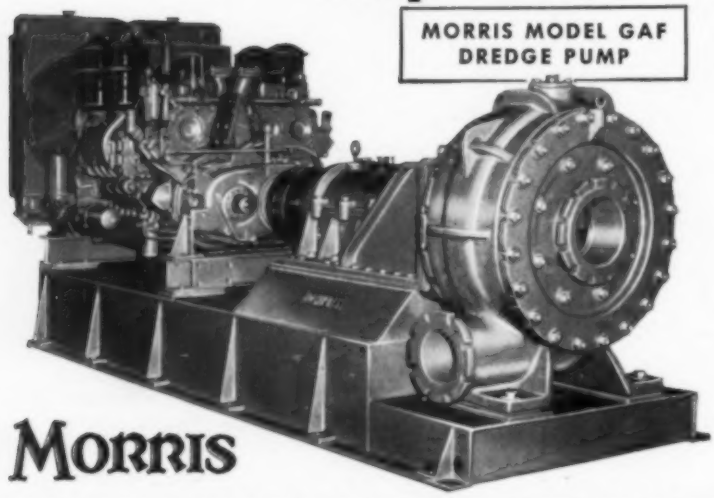
Better Things for Better Living
. . . through Chemistry

NEOPRENE

made by Du Pont for 25 years

For
COARSE REFUSE
Disposal

MORRIS MODEL GAF
DREDGE PUMP



MORRIS

DESIGN, PERFORMANCE, DURABILITY
Gives PEAK Pumping Economy

The dredge pump is the vital heart of any successful dredging or hydraulicking operation. Its ability to maintain high vacuum and freedom from mechanical difficulty makes the difference between profit and loss.

Morris Dredge Pumps, with their superior design and built-in dependability will consistently develop and maintain the high vacuum necessary to profitable production.

Solids output of Morris Pumps so far exceeds that of ordinary pumps that contractors refer to them as their "secret weapon". Over 90 years experience in hydraulic design and testing are built in every Morris Pump. Let Morris help you "put more on the bank".

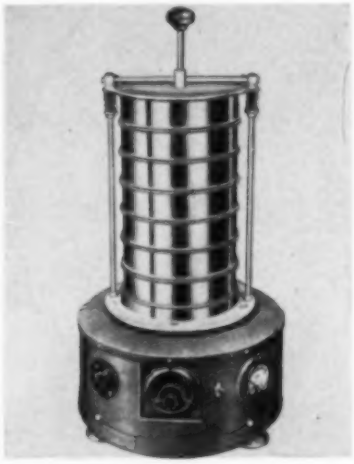
If you want to talk performance *and* durability write for Bulletin 184-A or contact your Morris representative.

MORRIS
CENTRIFUGAL
PUMPS

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

Equipment News (*Continued*)

feeder is available in sizes ranging from 3x8 ft up to 7x17 ft.



Sieve Shaker

Syntron Co., Homer City, Pa., has out an improved vibrating test-sieve shaker, which, they declare, has a more powerful electromagnetic drive and rapid gradation. A rheostat-voltmeter combination that enables the user to operate the unit at a constant 90 V, thus allowing accurate comparison tests, highlights the shaker. Adjustable feet and spirit level on the base rim give perfect leveling, states the company, and a reset timer guarantees accurately timed test periods.

Roller Bearings

"Duo-face" seal is what Timken Roller Bearing Co., Canton, Ohio, calls their new approach in sealed tapered roller bearings. It combines characteristics of the outside-diameter seal and the face-type seal. One lip operates in the bearing-housing bore, providing an outside-diameter seal. The other lip operates against the smooth, flat, hardened and ground face of the bearing cup providing face-type sealing. Says the company:

Crawler units are chain-driven from the propelling machinery. Each crawler is independently controlled by an air-operated friction clutch and band brake. Moves can be made up or down a grade of approximately 30% with the derrick up or down. This 40-R moves up to a new location at a Pennsylvania mine.

Manual effort is reduced to a minimum on Bucyrus-Erie rotaries by a remote-controlled, power-driven drill pipe rack which adds or removes drill pipe. Any one of four reserve pipes can be moved into position over the hole and screwed tight by power. The rack also stores pipe not in use. Hole can be drilled continuously for the full length of the pipe before an additional pipe section has to be added.

Continuous drilling progress at this Illinois mine is assured by an exclusive Bucyrus-Erie combination of features—variable drilling speed through Ward Leonard control, and variable down pressure through hydraulic motor control. Operator has smooth, instant command over rotation of the drill pipe . . . can choose the most efficient speed for a given formation, and vary the speed as needed without stopping the drilling operation.

Cost-Cutting Features Make Bucyrus-Erie Rotaries Favorites in Major Coal Fields

Workmen at an Indiana mine cover a charge with stemming material provided by the 50-R, at right. During drilling, the 50-R uses air bailing to remove cuttings and to cool the bit. Fine cuttings are picked up and handled by a precipitator; heavies pile up around the hole . . . make excellent and economical stemming material.

These and other Bucyrus-Erie features are bringing greater economies to coal mines and other open pit operations across the country. Some of the reasons why are indicated in the accompanying captions. For more information on Bucyrus-Erie rotary drills—the 50-R, with electric power, for drilling 9⅞- to 12¼-in. holes; the 40-R, with diesel-electric or full electric power, for drilling 6¾- to 9-in. holes—write, call, or see us today. 55857C

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

Equipment News (*Continued*)

"Damage that often happens to conventional seals during disassembly of machinery can't happen to the "Duo-face" due to its integral assembly with the bearing. Eliminated is polishing or turning of shafts and counter boring of seal seats with a corresponding savings resulting."

Safety Gloves

A new line of M-S-A gloves made of five molded materials including two types of natural rubber, Buna-N synthetic rubber, Neoprene, and Compar plastic having high resistance to oils and solvents, is announced by Mine Safety Appliances Co., Pittsburgh, Pa. A full range of sizes, weights and lengths (10½ to 18 in) with smooth, Firmhold, or other finishes are stocked, as well as finger cots of Latex and Neoprene.

Equipment Shorts

TENSION CONTROL—A newly re-engineered line of Econ-O-Matic motor bases announced by American Pulley Co., Philadelphia 29, Pa., is said to provide complete automatic tension control of short-center belt drives up to 250 hp. It is further stated that drive efficiency has been increased and belt life is lengthened.

BATTERY CHARGER—Two new single-phase, constant-voltage silicon-rectifier battery chargers, announced by C & D Batteries, Inc., Conshohocken, Pa., are designed to eliminate the need for special industrial wiring. Introduction of the new chargers in a market not presently covered by standard apparatus allows firms to take advantage of the latest material-handling methods without having to rewire their electrical power facilities.

MAGNETIC HOLDERS—A magnetic holder which attaches itself to iron or steel surfaces, thus eliminating drilling of holes for mounting brackets and haphazard clamping arrangements, is a product of Trico Fuse Mfg. Co., Milwaukee 12, Wis. They are also supposed to be handy for holding brackets, indicators, magnifying glasses, etc.

NYLON CLAMPS—Six new sizes of clamps are announced by Holub Industries, Inc., Sycamore, Ill. They are .562 to 1.000 in, I. D. sizes. According to the manufacturer, these clamps, made of Nylon, are extremely strong and tough and hold their shape even under severe stress. They are resistant to corrosion and sweating, says the firm.

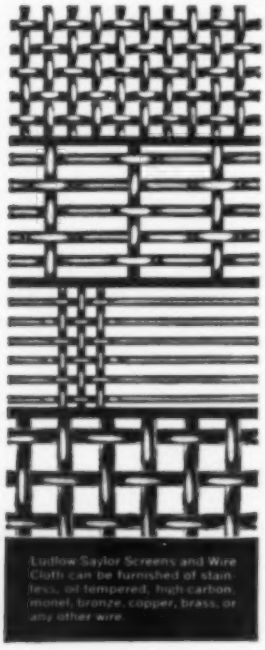
FAST WELDING—A new covered electrode, designed by Air Reduction Co., Inc., New York 17, N. Y. is described as a speed-up factor in welding because metal is deposited quickly at the rate of 17 lb per hr. This rate of deposition is said to be the fastest ever approached by a "stick" electrode and offers wide application.

Free Bulletins

SUCTION PUMPS—New York Air Brake Co., Aurora Pump Div., New York City, N. Y., describes in 8-p Bulletin No. 119-C a new line of Type BC general-purpose end suction pumps. The leaflet fully describes the products, listing features and suggesting various sorts of applications.

DRAG-BIT DRILL-HEAD—Austin Powder Co., Cleveland, Ohio, suggests its 2-p bulletin for those interested in the APA drag-bit drill-head. The literature discusses and illustrates how the step drilling pattern of APA speeds penetration and reduces bit-wear in air drilling of soft rock formations. Unlike

1 of every 3 production employees perform inspection operations to insure perfection of LUDLOW-SAYLOR Screens



Ludlow-Saylor Screens and Wire Cloth can be furnished of stainless, oil-tempered, high-carbon, monel, bronze, copper, brass, or any other wire.

No customer of ours ever worries about the quality and accuracy of the screens we ship him! With every third man in our factories charged with inspection responsibility, we make sure our product is right before shipment.

This costly and time-consuming extra care is another reason why L-S Screens stand up better under the toughest operating conditions—show less wear—retain their accurate openings longer. Yet L-S Screens never cost you more than ordinary screens.

Immediate Shipment of most weaves and sizes

Write for Condensed Screen Reference Catalog

Ludlow-Saylor

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SALES OFFICES: Birmingham, 1727-6th Ave. N.; Chicago, 5708 W. Diversey; Pittsburgh, Union Trust Bldg.; Houston, 1213 Capitol Ave.; Denver, 1530 Carr St. WEST COAST SUBSIDIARY: Los Angeles, Star Wire Screen and Iron Works, Inc., 2515 San Fernando Road.

When your problems call for the last word on underground mining

Check Your Coal Age Guidebook *First*

Packed between the covers of the annual Mid-July Mining Guidebook is a 247-page practical working manual covering all phases of mine operation—the only complete, single-volume reference guide to present-day mining methods and equipment available anywhere.

The 81-page Deep-Mining Guidebook—just one of the seven editorial sections—offers you a fast-reading analysis of efficient mining practice, tied in with operating experience and results gathered from hundreds of successful mines and highlights of the new and significant trends important to you. Other sections brief you on auxiliary services, such as preparation, maintenance, supply handling and safety. You'll find the entire Guidebook a thoroughly indexed, easy-to-use reference tool to help you develop new ideas and a fresh slant on operating problems.

For speedy reference to equipment, materials or services meeting your particular needs, turn to the 63-page Buying Directory listing all known manufacturers of over 1,100 products used in coal mining. Completely revised and up-dated for the 1957 issue, this comprehensive guide is supplemented by detailed product information in manufacturers' advertising and the location of your nearest source of supply in the list of sales offices and distributors.

DEEP MINING • STRIPPING • PREPARATION • MAINTENANCE • SUPPLIES • SAFETY • TRAINING • OPERATION STANDARDS • BUYING DIRECTORY

An Annual Coal Age Subscriber Service—
Used Daily by Progressive Mine Management

Reduce Picking Table Labor ...Recover More Coal!

AMERICAN Heavy Duty "S" CRUSHER

CRUSHES ROM COAL, ROCK, SLATE, SULFUR BALLS AND GOB...WITHOUT OVERSIZE

A dozen installations of the new Heavy Duty "S" Crusher prove that it cuts labor costs by eliminating men at the picking tables.

It also offers important savings in recovered coal—coal that was formerly thrown away because of imbedded impurities. It is now crushed and washed for reclamation.

By cutting labor costs, by adding to your output, the new Crusher pays for itself in less than a year. From then on it's clear profit.

WRITE FOR LITERATURE.

American PULVERIZER COMPANY — Designers and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE. • ST. LOUIS 10, MO.

Equipment News (*Continued*)

blade-type drill heads, bits can be quickly replaced with hammer and punch.

HIGH-SPEED MOTORS—General Electric Co., Schenectady 5, N. Y., releases a new bulletin on high-speed synchronous motors and the company services that go with them. Large cutaway drawings give an x-ray view of the horizontal and vertical motors of 1,500 hp and up.

HYDRAULIC FLUIDS—Vickers Inc., Detroit 32, Mich., publishes a brochure on selection, operation and maintenance of hydraulic fluids for industrial machinery. It describes the characteristics of petroleum-base and fire-resistant hydraulic fluids, telling how to select the best fluid for a given job and how to care for it.

LUBRICANTS — Whitmore Mfg. Co., Cleveland 4, Ohio, has out a folder designed to serve the mining, construction and manufacturing industries as a reference in determining the correct Whitmore lubricant to use for specific equipment application and for varying seasonal temperatures. More than 40 different lubricants are described.

SPECIALIZED EQUIPMENT—Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio, makes available "Sky High to Ocean Blue," a 12-p booklet, discussing in words and illustrations, the specialized drives and motors engineered and built to industrial and government specifications. A wide range of Reliance motors, generators, variable-speed drive systems and controls are covered in the leaflet.

ROTARY CAR-DUMPER—Heyl & Patterson, Inc., 55 Fort Pitt Blvd., Pittsburgh 22, Pa., offers a 16-p brochure on its new rotary car-dumper. The machine, it is reported, is capable of handling hopper and gondola cars, and is equipped with two clamps which hold the car secure without use of counterweights. The firm also states that the dumper is so well balanced that it can dump and return a spotted car in one minute.

TRANSFORMERS—R. E. Uptegraff Mfg. Co., Scottdale, Pa., publishes a new engineering manual on four series of dry-type distribution transformers. Data is included on these four series: 3 to 10 kva, class H insulation; 15 to 112½ kva, class H insulation; 3 to 112½ kva, class B insulation; 150 to 500 kva, class B insulation.

WELDED STEEL PIPE—Armco Drainage & Metal Products, Inc., Middletown,

Name your bearing needs...we'll meet 'em pronto from 30 types, 10,247 sizes

TIME and time again, machinery makers come to the Timken Company for help with some special bearing application problem. One they think hasn't been solved before. And time after time, from our 30 types and 10,247 sizes of Timken® tapered roller bearings, we've come up with the bearing design to do the job and at minimum cost.

It's no accident that we can help out so often. In over 50 years of helping machinery builders with bearing problems, we've engineered and produced the world's largest selection of tapered roller bearings. And we've constantly improved our designs. The answers to thousands of bearing application problems are already in our files. Ready and available to help you.

And machine users get the same swift service if they ever need a replacement Timken bearing. Even for old machines, they can almost always count on immediate delivery of Timken bearings for replacement.

Why not call on our engineers for help whenever you have a bearing application problem or requirement? Timken is your No. 1 bearing value. Wherever wheels and shafts turn, Timken bearings eliminate friction, cutting wear and maintenance to a minimum. Specify bearings trade-marked "Timken" for the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

There's no question — about the importance of Roof Bolting today.

HUNDREDS of bolted mines—representing 62% of the 1956 underground coal production—improved their safety records and increased production from 10 to 20% per man resulting in lower labor costs. Effective bolting calls for thorough knowledge of roof strata—well planned bolting patterns and cycles—proper selection of bolts and shells with an adequate supply and service program. PATTIN Mfg. Company. "The Pioneer In Roof Bolting" offers the most complete line of quality bolting products with an experienced engineering staff for consultation and service. Write or phone us today.

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MFG. COMPANY
Marietta Ohio
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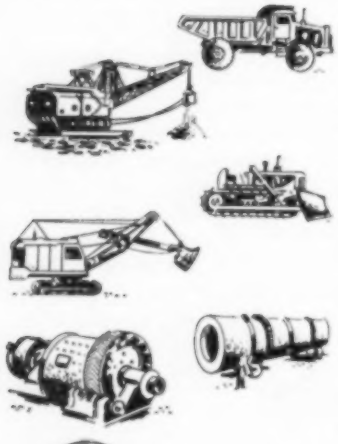
WANTED
YOUR TOUGH LUBRICATION JOBS



World-famous Whitmore Lubricants succeed where others fail. They are lubricants, not greases. Whitmore's exclusive never-duplicated formulas stop metal-to-metal contact—put wear on the lubricants instead of on costly gears, bearings, and cables. That's why manufacturers of earth, rock, coal, and ore moving and processing equipment recommend Whitmore Lubricants to give you the service they built into your equipment.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

OPEN GEARS, DIPPER STICKS, AND CAMS
Never-duplicated formulas that provide a hard finish impervious to moisture. Absolutely impossible for dust to cling to lubricated surfaces.

ENCLOSED GEAR CASES
Extremely high load carrying capacities for climatic conditions from the Tropics to the Arctic.

WIRE ROPE AND CABLES
Increases yardage life up to three times. Absolutely stops corrosion by penetrating to the cable core and eliminating internal friction.

Complete Line of Lubricants for Hydraulic Units, Torque Converters; Roller, Ball, and Sleeve Bearings; Speed Reducers.

Write for FREE samples, FREE data, FREE "on your job" engineering assistance.

THE WHITMORE MFG. CO.
LUBRICATING ENGINEERS
CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

Equipment News *(Continued)*

Ohio, issues a brochure on its welded steel pipe for industrial uses. Diameters range from 6 to 3 in; wall thickness, 3/64 to ½ in. Applications discussed are factory piping, process piping, water supply and sewage disposal, contractor's pipe requirements and base products.

SLING-CHAINS — American Chain & Cable Co., Inc., Chain Div., York, Pa., will send upon request, an informative bulletin, No. DH-54, on localized sling-chain service programs which have been instituted to solve sling-chain problems of slow delivery. It contains data on choosing proper chain size and style as well as load limits at various angles and repair of sling-chain assemblies.

POWER-CRANE—Thew Shovel Co., Lorain, Ohio, turns out an 8-p catalog describing its new 35-ton "Moto-Crane," Model MC-530. The complete story of this full-rated, 35-ton-lift-capacity crane is told, and its special features, such as a narrow-gage, 108-in wide carrier and easy transportability are played up with several photos.

CENTRIFUGAL PUMPS — Allen-Sherman-Hoff Pumps Co., 259 E. Lancaster Ave., offers two 4-p folders presenting the interchangeable split-shell Hydroseal and Centriseal slurry pumps, all parts of which are identical except their rubber impellers and engine-side shell half-liners. Both pumps are rubber-lined and are illustrated at several angles in the pamphlets.

WIRE ROPE — Macwhyte Co., Fabricated Product Sales, Kenosha, Wis., says in new Bulletin No. 50 that it is no longer necessary to make up cable assemblies by hand with splicing or clipping. The booklet gives examples of how precision lengths of wire rope with fittings permanently attached by swaging are pre-fabricated to order, making it possible for assemblies, ready for installation, to be carried in stock.

CARBIDES—Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa., puts out a new technical manual on carbides. The manufacture and physical properties of tungsten carbide, Firthite grade selection, use of single-point tools, and recommended Firthite cutting speeds are featured.

MOBILE SHOPS—Davey Compressor Co., Kent, Ohio, invites requests for Bulletin E-208, describing its complete line of mobile machine shops. Replete with photos and blueprints of typical shops, the leaflet tells about truck-mounted units designed to meet all needs of users operating over extensive areas.

Symbols of Strip Mine Efficiency

These huge walking draglines are representative of modern, highly-efficient strip mining methods. They are two of nine Marion machines owned by this company and help supply a major portion of the coal used by power and industrial plants of the Indianapolis area.

CONSULT **MARION** MINING SPECIALISTS
for lowest costs on your property!

MARION POWER SHOVEL COMPANY • MARION, OHIO

A Division of Universal Marion Corporation

Among the Manufacturers

New Affiliation

Harnischfeger International Corp., a wholly owned subsidiary of Harnischfeger Corp., announced its association with Equipamentos Industriais Villares S. A., Sao Paulo, Brazil.

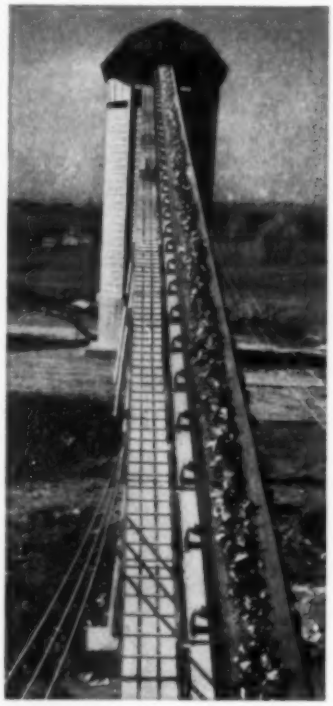
This association, comprising a partial ownership of Equipmentos Industriais Villares by Harnischfeger International Corp., provides for Brazilian manufacture of P&H power shovels and truck cranes in a complete range of sizes from ½ to 2½ cu yd capacity.

Changed Location

Carboline Co., St. Louis, Mo., manufacturers of corrosion-resistant protective coatings and linings, moved their general office and research laboratory to a new building.

The move was in line with a general expansion program, and the new location gives them triple the space of their previous spot. Among the innovations planned are an application research department with various types of equipment now available for coating applications.

BELT FAILURES?
Switch to
NEW YORK RUBBER!



New York Rubber, famous since 1851, manufactures belt designed to meet trouble—and overcome it! Built for the most severe service demands, there's a New York Rubber belt designed to solve *your* problem. Mineral mining, quarrying, coal mining—these activities often require a belt that will show superior resistance to sharp and abrasive materials, frequently in the presence of oil and grease conditions. Fire, too, takes its toll of conventional belts.

That's why it will pay you to investigate New York Rubber. A brief description of four of our most popular belts follows. Write on your letterhead for more complete details on these and other superior New York Rubber Belts.

REDUCE FAILURES
with these New York Rubber belts:

STONORE—Highest quality, for most severe service. Handles heavy ores, trap rock, crushed stone, coarse broken glass, slag, cement clinkers, direct feed from digging and mining machinery. Mildew-proof.

DEPENDABLE—For handling coal both under and above ground, sand and gravel, trap rock, sulphur, lime and limestone. Ideal for sub-zero temperatures. Mildew-proof.

NEOPRENE—Resists oil and grease conditions adverse to natural rubber. Handles caustics and coal briquettes. Heat-resistant to 250°F. Mildew-proof.

TEMP-PRENE*—A neoprene compounded for fire resistance and severe, rough surfaces. Mildew-proof.

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-11".

NY RUBBER
NEW YORK RUBBER
CORPORATION
Established 1851
100 PARK AVENUE • NEW YORK 17, NEW YORK

Modern Facilities

Completion of their new factory has just been announced by Hoffman Bros. Drilling Co., Punxsutawney, Pa.

William Hampton, president of the firm, states that "the new building not only combines administrative and manufacturing facilities under one roof, but will also increase production of Hoffman oriented diamond bits by 65%." The new facilities include ultra-modern equipment for setting, heat treating, testing, tooling and design.

International Harvester Co. entered into arrangements with the Cone Automatic Machine Co. of Windsor, Vt., and Wagner Iron Works of Milwaukee, Wis., whereby it will purchase back hoes and commercial heavy-duty front-end loaders.

The machines will be for use with IH utility-type wheel tractors, for resale to its dealers and company-owned retail outlets.

Ralph Hall was chosen to be field service representative of the "Michigan" line in Pennsylvania, Ohio, Virginia, West Virginia and Kentucky, for Clark Equipment Co.

Mr. Hall had 10 yr experience in construction work. He operated and serviced construction machinery for major contractors throughout the country—working on the New York Thruway, Army and Naval bases in Virginia and highways in Texas.

Wilbur D. Lawson, former fuel engineer for Pittsburgh Consolidation Coal Co., was appointed field service engineer for Bituminous Coal Research, Inc.

Mr. Lawson will provide customer engineering service at BCR field instal-

Simple, balanced design allows this 6-yd. Manitowoc Model 4500 drag to get over-flowing buckets right at the edge of the cut.

MANITOWOC DESIGN PUTS ALL THE POWER TO WORK

There's no wasted horsepower with a Manitowoc Model 4500. Intelligent design forethought has reduced power-robbing extra parts throughout this big capacity mining machine. In fact, there are only 15 gears and 8 sprockets! And *only working gears turn* . . . Manitowoc's exclusive slide pinion arrangement disconnects all others until their function is needed. Even many *small* excavators don't have simplicity of design like this!

Powered by a single diesel power package rather than a series of independent electric motors, the 4500 has the get up to go anyplace . . . unhampered by trailing electric power cables. There's no downtime due to the failure of delicate electric switches, control boards or miles of wires. Put more power to work in *your* mine with a fast digging, long reaching Manitowoc 4500 shovel or dragline. A call to your Manitowoc distributor will bring all the facts.

GREATER SPEED AND POWER—LESS DEAD WEIGHT

TRUE MOBILITY TO MAKE MINING PROFITABLE ANYWHERE

GREATER STABILITY PRODUCES FULL BUCKETS, LOWER GROUND PRESSURE

DRAG TRAVELS ANYPLACE WITH A LOW, LOW TRAVEL CLEARANCE OF ONLY 17' 2"

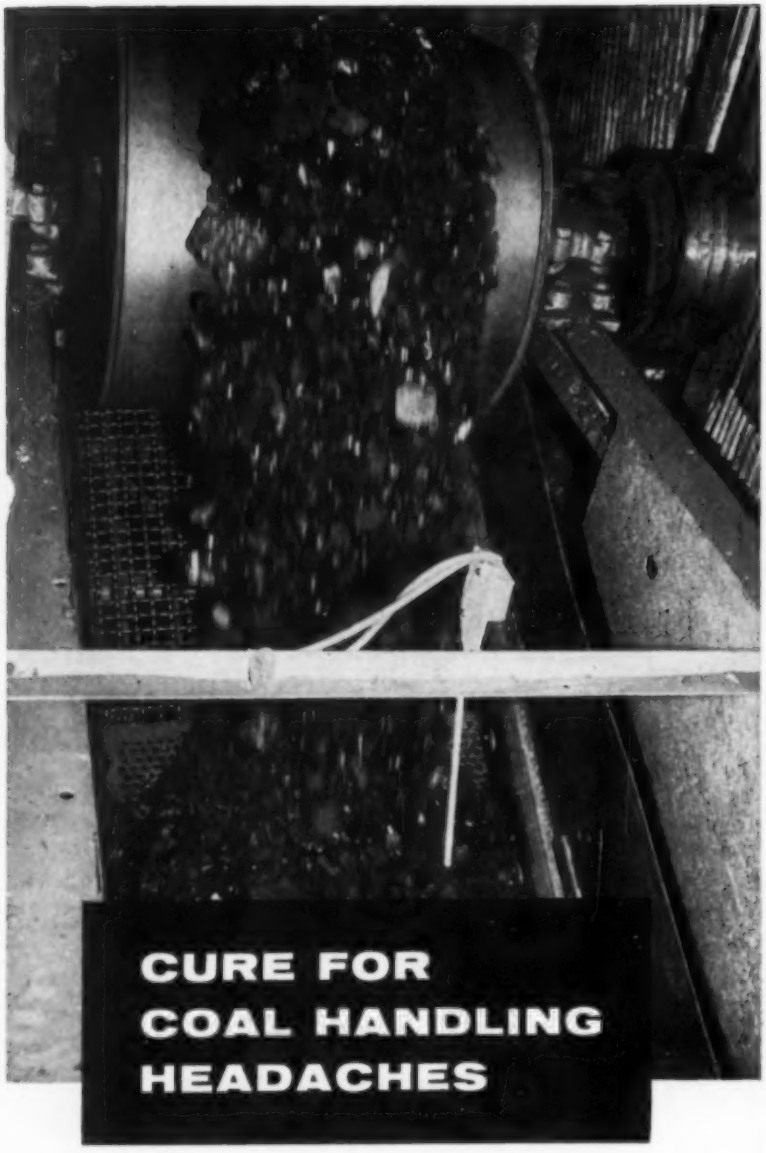
BONUS CAPACITY IN ANY MATERIAL—MANEUVERABILITY OF A SMALL MACHINE

SHOVELS 1 - 5½ YD.

Manitowoc

CRANES 20 - 100 TON

MANITOWOC ENGINEERING CORP. Manitowoc, Wis.



To get out more coal at less cost, Zeigler Coal & Coke Corporation's Bradbury Mine uses a Hewitt-Robins belt conveyor system. Coal, transferred from 5,000 ft. of panel belts to a 4,000 ft. mainline conveyor system, is discharged to a 42" wide, 950 ft., 16° slope conveyor traveling at 450 FPM. This conveyor delivers 450 TPH to an H-R Vibrex Screen which removes fines ahead of the breaker.

The underground haulage system, including conveyor belts, idlers, and machinery, was designed, engineered, and manufactured by Hewitt-Robins. To find out how H-R products and services can help you, consult your classified telephone directory for the nearest H-R representative, or contact Hewitt-Robins, Stamford, Conn.

HR HEWITT-ROBINS

CONVEYOR BELTING AND IDLERS...POWER TRANSMISSION DRIVES
INDUSTRIAL HOSE...VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

Manufacturers *(Continued)*

lations and will maintain liaison between BCR and fuel engineers throughout the industry.

Ralph C. McMillan, former assistant chief engineer and David A. Davis, divisional engineer, both of Pershing Road plant of Link-Belt Co., were appointed chief engineers at the Cadwell plant in Chicago.

Mr. McMillan has been with the Pershing Road plant since 1927 and Mr. Davis began his career with that same plant in 1929.

George F. Burley was elected vice president for purchasing and traffic of Crane Co.

The company, located in Chicago, manufactures valves, plumbing and heating equipment. Mr. Burley, most recently, was director of purchases for Warwick Mfg. Co., producer of television and radio equipment. His responsibilities there included direction of all traffic activities, in addition to purchasing

Fred J. Rossi was promoted to assistant commercial tire sales manager for General Tire & Rubber Co. after a successful stint with the firm's Acron division.

Associated with General Tire since 1951, he joined the organization as service manager in the Boston division and later transferred to the Acron territory.

Dr. Joseph F. Treon has been chosen to head a new toxicology section in the chemical research department of Atlas Powder Co.

Research will be carried out on the safety of Atlas products from the standpoint of handling, use and consumption. Dr. Treon, with Atlas since last May, came from Kettering laboratory of the University of Cincinnati's College of Medicine.

J. J. Sieber was named vice president in charge of sales for Broderick & Bascom Rope Co.

Mr K. B. Brit will succeed Mr. Sieber, in the position of sales manager. Both men have been with the firm for many years.

John L. Cross has been picked as industrial sales manager for Westinghouse Electric Corp.'s Atlantic apparatus sales region in Philadelphia, Pa.

A product of the Westinghouse student training course which he entered in 1933, Mr. Cross served as assistant sales manager of apparatus products until now.

E. J. Mercer, William M. Wallace and P. F. Bauer were nominated as

New advantages for truck owners introduced in all-new Dodge Power Giants for '58

Power, payload, economy and styling features make Dodge 4-way leaders of low-priced 3

Recent introduction of the new '58 Dodge *Power Giants* brings truck owners a series of the most outstanding advances in Dodge truck's 40-year history.

In power, for instance, Dodge offers three new *Power Giant* V-8's that provide up to 234 hp. . . . as much as 24% more than other low-priced makes. These extra-powered engines can take it easy under normal loads . . . keep going longer, too.

Payload capacities are up to an all-time high. Chassis construction features the elimination of excess weight while actually increasing strength. You get as much as ⅓ more payload capacity.

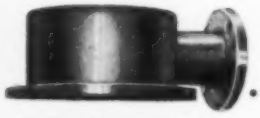
When it comes to economy, Dodge sweeps the field because of its exclusive Power-Dome V-8 engine design that reduces harmful carbon deposits. This improves gas mileage . . . practically eliminates the need for major engine overhauls.

Dodge styling gives truck owners a real prestige bonus. Striking dual headlights, massive new grilles and luxury cabs are exceptional highlights.

All in all, truck owners would be well advised to check into the '58 *Power Giant* line-up before replacing or adding units. These Dodge trucks are definitely four-way leaders of the low-priced three.

DODGE *PowerGiants*

H&P wet cyclones



The NEW H & P 8″ x 14° Cyclone

is an efficient classifier in the 10 to 60 micron size range and combines the high efficiency of the small diameter cyclone with the flexibility and high output of the larger sizes. It has a nominal rating of 90 GPM at 35 PSIG feed pressure.

In the Coal Preparation Plants, the New H & P 8″ Cyclone is used:

TO RECOVER marketable coal, conserve water and increase pond life.

TO PREPARE feed to froth flotation units.

TO PROCESS the overflow of drag tanks, providing closed circuit operation for small preparation plants.

The H & P 8″ Cyclone features replaceable rubber liners for the body sections, feed chamber, and overflow chamber.

H & P 8″ Cyclone

H & P Cyclones serve the coal industry by the thousands . . . permitting

- **Closed circuit operation**
- **Recovery of fine coal**
- **Prevention of stream pollution**
- **Control of washing water density**
- **Conservation of water**
- **Sharp classification for washing operation**

For the most economical classifying and thickening operation investigate the H & P Cyclones. Get all the facts . . . Write for booklet 1157 today!

Heyl & Patterson INC.

55 FORT PITT BLVD., PITTSBURGH 22, PA., COurt 1-0750

Manufacturers *(Continued)*

vice-presidents of Allis-Chalmers Mfg. Co.

The former two were general managers and the latter was managing director, Allis-Chalmers International.

Mr. Mercer joined the company as a student engineer in 1937. Mr. Wallace also began in 1937 as a sales representative. Mr. Bauer started his carer back in 1928.

Thomas S. Layton has been appointed sales engineer for Goodman Mfg. Co. and has established headquarters at Carlsbad, N. M.

Mr. Layton brings to his new post a background of engineering studies at the University of Maryland and 13 yr mining experience, his most recent as general superintendent and assistant to the president at a West Virginia property.

Bruce D. Crawford was made general manager of Linatex Corp. of America after concluding a successful career with American Cyanide Co.

At American Cyanide, he worked in laboratory research and d'd field work in the mining and chemical divisions. In 1950 Mr. Crawford was transferred to the company's South African affiliate, working there through 1956.

Wilbur E. Ellis and Joseph F. Milmine have been appointed general sales manager for the division of Poor & Co. and eastern sales manager for Kensington Steel Co., respectively.

Mr. Ellis, with the company since 1926, was formerly on the sales engineering staff. Mr. Milmine was head of the engineering department before going into sales.

L. E. Long was appointed manager of the San Francisco electrical sales branch of Wagner Electric Co.

Mr. Long joined the Wagner organization in 1934 as a student engineer. From 1936 until now, he was a sales engineer in the company's Los Angeles branch.

J. W. Darling was made sales manager, Davey Compressor Co.

Mr. Darling, affiliated with Davey for the past 12 yr, was formerly assistant vice president, a position he will retain in addition to his new duties. His experience also includes service as manager of government sales and as midwestern district manager in charge of the firm's Chicago office.

W. C. Schumacher was nominated for a board member and executive vice president of International Harvester Co.

FREE new folders on Parker No-Skive Hoze-Lok

These fully-illustrated folders, Nos. 4433, 4434, show you step by step how to get around the time-consuming job of stripping hose covers . . . by simple, effective hose assemblies with Parker no-skive Hoze-lok fittings. Just turn the hose (with cover intact) into socket.

These folders catalog the new series of Hoze-lok styles and sizes. Four different connecting ends.

Send also for FREE Parker Catalog No. 4310 for information about Triple-lok flare tube fittings.

PARKER FITTINGS AND HOSE DIVISION

Parker Hannifin
creative leader in fluid systems

Order from your Parker Distributor — or Parker Fittings and Hose Division, Section 432-G, Parker-Hannifin Corp., 17325 Euclid Avenue, Cleveland 12, Ohio

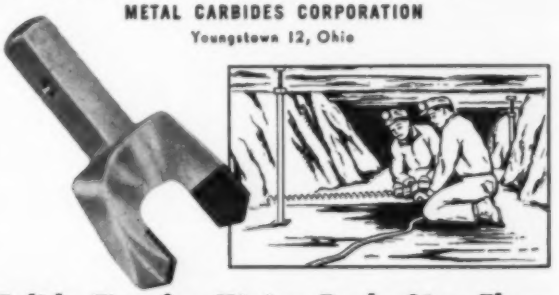
A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N.Y.

SUPERSET CORE BITS

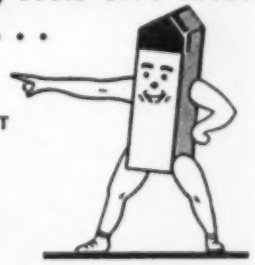
● Mining contractors, ore prospectors, coal operators and construction firms are realizing tremendous savings by taking advantage of our **exclusive fabrication service!** Contractors send us the necessary diamond stones from their own stocks—we hand set them in a super-hard tungsten carbide crown and braze to the threaded steel blank. Hand-set bits assure the proper positioning of each diamond stone to achieve maximum cutting efficiency. The carbide matrix holds the diamond stones until entirely used up. These advantages mean lower drilling costs to you. We can also supply complete core bits or salvage the stones from used bits at nominal cost. Supplied in standard sizes EX, EXE, AX, BX, NX, etc.

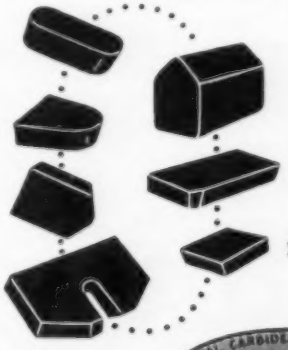
METAL CARBIDES CORPORATION
Youngstown 12, Ohio



Talide Tips for Mining Tools Give These 3 BIG ADVANTAGES . . .

1. EXTRA STRONG
2. SUPER HARD
3. SHOCK RESISTANT

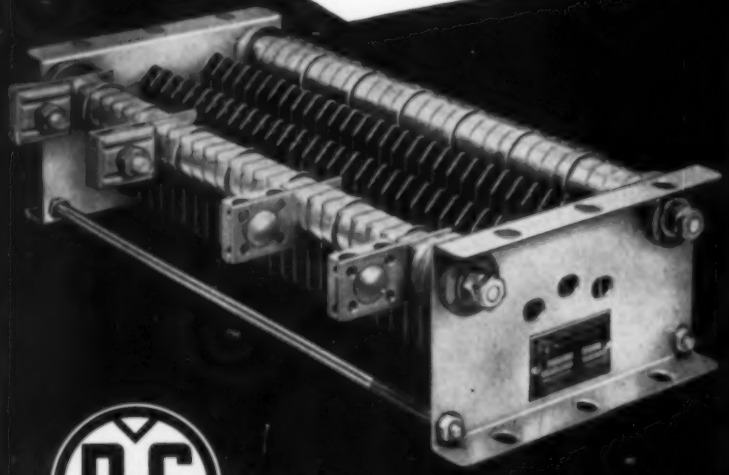




● A complete line of low-cost, high-quality Talide Tips is offered fabricators and users for tipping machine bits, rock bits, drill bits, roof bits and open-pit bits. All Talide Tips have a special surface finish that facilitates brazing. Non-standard shapes and sizes quoted on request.

METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

There is a *difference* in Resistors



P-G Resistors have proved this for many years

Different, because steel and mica, both extremely durable materials, coupled with P-G exclusive design produce a resistor of great mechanical strength. There is nothing to break. With accurate resistance values and adequate carrying capacities, P-G Resistors outlast ordinary resistors. Tell us your specifications and let P-G solve your resistor problem.

For any job . . . Where constant "trouble free" resistor service is wanted . . . you can safely specify P-G Steel Grid Resistors and get better performance with low cost maintenance.

The Nonbreakable Steel Grid Resistor

P-G

THE POST-GLOVER ELECTRIC COMPANY
OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky
MAILING ADDRESS—Box 709, Covington, Kentucky

Manufacturers (*Continued*)

Mr. Schumacher has been a member of International Harvester since 1917 and is widely known throughout the motor truck industry. He has a long and successful record of International truck sales activities, and served as the motor truck division's first sales manager when it was formed in 1944.

Len Wichman was selected to become eastern regional manager for sales and service in the construction and road-building equipment line for Pettibone Mulliken Corp.

Taking over the headquarters in New York City, Mr. Wichman will supervise the New England states, New York, New Jersey, Pennsylvania, Maryland, West Virginia, North Carolina, Virginia and Delaware. He was formerly a district representative.

John P. Ganley became assistant treasurer for the Chesapeake & Ohio Ry. after serving for some time as assistant to the treasurer.

Mr. Ganley, a certified public accountant, has served C&O as chief internal auditor, acting controller and assistant treasurer of a number of affiliated companies.

F. J. Hirner, a member of the P&H sales force for 19 yr, was named sales manager of Electric Excavator Div., Harnischfeger Corp.

Other selections made public were: W. N. Ryan, district manager—Chicago office; G. T. Raubach, assistant sales manager—Electric Shovels Div.; R. B. Maxson, district manager—Buffalo, N. Y.; and C. R. Morvan Jr., sales manager—soil stabilizers.

HERBERT FOX is first-shift tipple foreman at Peabody's River King mine. (See River King article, p 76.)

Equipment Approvals

(Continued)

Eighteen approvals of permissible equipment were issued by the U. S. Bureau of Mines during October.

Joy Mfg. Co.—Type 12RB cutting machines; two motors, one 50 hp, one 30 hp, 500 V, DC. Approval 2-752A. Oct. 1

Ensign Electric and Mfg. Co.—Type F distribution box; one 100-amp breaker, 220/440 V, AC. Approvals 2-1292/2-1292A, Oct. 2.

Central Mine Supply Co.—Model 1C00 wet rock duster; one motor, 3 hp, 230 V, DC. Approval 2-1293, Oct. 3.

Acme Machinery Co.—Model HUS utility truck; one motor, 15 hp, 230 V, DC. Approval 2-1294, Oct. 16.

Ensign Electric and Mfg. Co.—Type MGG distribution box; one 800-amp, two 100-amp breakers, 230/550 V, DC. Approvals 2-1295/2-1295A, Oct. 25.

Goodman Mfg. Co.—Type 570-11 shuttle car; three motors, two 15 hp and one 10 hp, 250 V, DC. Approval 2-1296, Oct. 25.

The Long Co.—Models MH-330, MH-336, ML-330 and ML-336 conveyor drive units; one motor, 25 hp, 230 V, DC. Approval 2-1297, Oct. 28.

The Jeffrey Mfg. Co.—Type GDM cable-reel gathering locomotive; four motors, two 33 hp, one 1/4 hp, and one torque motor, 250 V, DC. Approval 2-1298, Oct. 28.

The Long Co.—Type PT218 piggy-back conveyor; two motors, 5 hp, 230 V, DC. Approval 2-1299, Oct. 28.

The Long Co.—Type PT218 piggy-back conveyor; two motors, each 5 hp, 220/440 V, AC. Approvals 2-1300/2-1300A, Oct. 29.

Joy Mfg. Co.—Type ICM-3AE/F continuous miners; seven motors, two 100 hp, one 15 hp, two 10 hp and two 7½ hp, 250/500 V, DC. Approvals 2-1301/2-1301A, Oct. 30.

The Youghiogheny and Ohio Coal Co.—Rebuilt Joy 32D-12E cable-reel shuttle car; four motors, three 5 hp and one 4 hp, 250 V, DC. Approval 2-1302, Oct. 30.

Joy Mfg. Co.—Types 16SC2PE-1, 16SC2PXE-1 cable-reel shuttle cars; five motors, two 15 hp, one 10 hp, and two 5 hp, 250 V, DC. Approval 2-1303, Oct. 31.

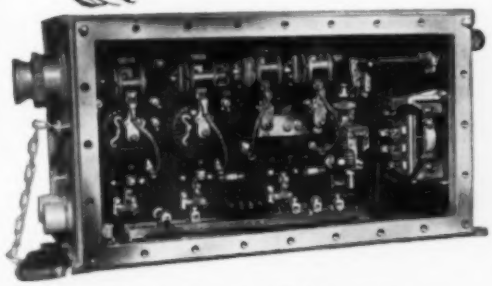
The Jeffrey Mfg. Co.—Type ML81C loader; five motors, four 15 hp and one 4 hp, 250 V, DC. Approval 2-1304, Oct. 31.

FIRST CHOICE OF MINE OPERATORS...

ENSIGN

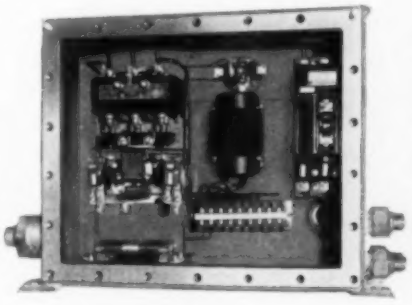
ELECTRIC STARTERS

Standard of the industry for safe and efficient starting of all types of heavy electrically operated mine machinery.



ENSIGN Bulletin 5392
Reduced Voltage Starter

Sturdily designed and dependably built for smooth, efficient operation of belt conveyor systems and other heavy mine equipment. Three point acceleration—reversing, with reversing switch interlocked to prevent plugging—Bureau of Mines explosion-tested enclosure. 20-30 HP, 230 Volt D.C. capacity.



ENSIGN Bulletin 6320
40 H.P. A.C. Magnetic Starter

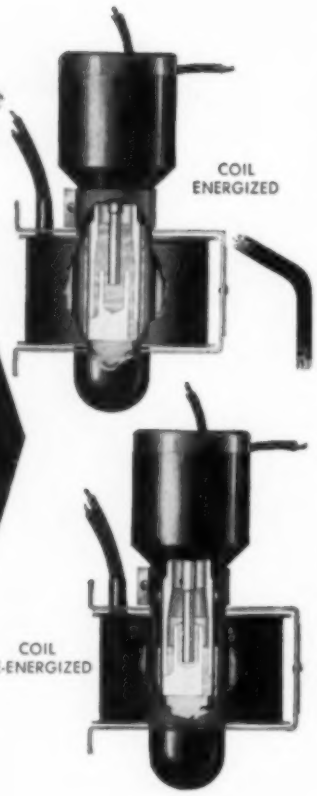
Bureau of Mines explosion tested enclosure—non-reversing with air circuit breaker and selector switch. Available in manual and magnetic reversing.

Product of ENSIGNeers

ENSIGN
ELECTRIC AND MANUFACTURING CO.
914 Adams Avenue Huntington 4, W.Va.

The
TIMER RELAY
that handles all controlled timing problems . . .

★ No false contacts
★ Non sticking
★ Practically "fail safe"
★ Low cost timer



Durakool®
STEEL MERCURY TIMERS

This steel clad, factory set, tamper proof Durakool timer-relay is practically non-breakable. Operating life multiplied 5 to 6 times by new plunger construction features. Combinations of operate-release time delays from 0.15 sec. to 20 sec.—either normally open or normally closed action.

See telephone directory for local distributor, or write.

DURAKOOL, INC.
ELKHART, INDIANA, U.S.A.
700 WESTON RD., TORONTO 9, CANADA

Guyan
HEATERS

FOR CONFINED AREAS

ALSO AVAILABLE IN FLOOR TYPE

WALL TYPE

RUGGED and ECONOMICAL TOO!

WHEN the space is hard to heat — such as a crane or locomotive cab, a pump house or small office — a GUYAN natural convection heater is the answer. It is a DEPENDABLE, LONG-LIFE HEATER consisting of corrosion-resistant aluminum chromium wire — wound on ceramic forms — and mounted within expanded steel housings.

GUYAN Heater Units are ruggedly built to stand the hard service that is customary in tough industrial applications. Available from 1,500 thru 7,500 watts for 110, 220, 440 volts DC or AC. Priced right — more economically than you might think — and lower than you can make your own. Write for complete information.

GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

Guyan
HEATERS

Mining Institute (*Continued*)

pacity since total connected load is not generally the sole governing factor.

Summarizing electrical breakdowns on six continuous miners, 10 loading machines, 10 shuttle cars and 10 compressors, Mr. Sarff reported that at Ireland there have been three holding-coil burnouts, one time-delay holding-coil burnout, several starter-tip replacements and some push-button troubles. The push-buttons have been the greatest problem, Mr. Sarff noted.

Auxiliary Ventilation

The problem of face ventilation has been complicated by boring-type continuous miners which virtually fill the face area and act as barriers to the flow of low-velocity currents across the face. Tests prove this effect is possible, according to R. W. Stahl, who has been studying this problem and possible solutions since last June. The studies are designed to search for remedies without damaging the productive efficiency of the machines. Another complicating factor is the presence of a pile of coal behind the machine in many instances while waiting for a shuttle car.

The efficiency of the line brattice leaves a lot to be desired, and these other obstructions add to the burden of sweeping active faces with sufficient air. Accordingly, the Bureau of Mines conducted several tests with auxiliary fans, which demonstrated the ability of these units to improve the situation appreciably in face areas.

Applications included the use of an exhaust fan, the use of a blower fan and the use of a combination of the two. The exhaust fan removed dust and made the place more comfortable, but it did not remove gas from the face satisfactorily. The only real objection to the blowing system was the dispersal of dust, especially where the ribs were not wet. The combination seemed to produce ideal face ventilation, Mr. Stahl said, although it is recognized that carrying two tubes to the face area is impracticable. Now it is deemed reasonable to mount a small blower on the machine and provide only an exhaust tube outby the machine.

Gas-Well Pillars

The Pennsylvania Gas Operations, Well Drilling, Petroleum and Coal Mining Act, No. 225, was signed by Governor Leader on Nov. 30, 1955, and a skeleton force in the Dept. of Mines began the work of implementing its provisions in January, 1956. Mr. Cunningham reported that his organization now is ready to enforce the provisions of the legislation, according to the intent of those who wrote it.

Studies were conducted to guide the writing of specifications on gas-well pil-

lars. A summary of the requirements is as follows:

1. The pillar or pillars comprising the required pillar plan should be in the form of a square.

2. The well should be centrally located within the required pillar plan.

3. The required pillar plan should conform to the following specifications, wherein depth of cover shall be used to determine the pillar dimension in accordance with a definitely required bearing-surface schedule.

For example, the total bearing area in pillars under cover up to 149 ft deep must be 3,600 sq ft. In cover of 650 ft or deeper, the total bearing area must be 40,000 sq ft. There are five gradations between these extremes. In larger pillars, that is, those under 350 ft or more of cover, the pillars may be split after certain specifications are met in providing bearing area in the main pillar around the well.

Roof Safety

Development of supervisors, mechanics and electricians, and achieving of safety through intelligent selection of employes were major subjects of the Friday afternoon program. Speakers were C. H. Hoch, National Safety Council, Chicago; W. A. Fullarton, special assistant to the president, Pocahontas Fuel Co. Inc., Pocahontas, Va.; and C. G. Evans, personnel manager, North American Coal Corp., Cleveland, Ohio. Session chairman was J. D. Reilly, vice president elect of the institute.

National Campaign

"I hardly need to remind you about the seriousness of our major safety problem," Mr. Hoch said. "Progress has been made but during the past several years further efforts at improvement have met a brick wall and 1957 is no exception."

Mr. Hoch pointed out that when individual mines in the industry have attacked the roof fall problem with determination and vigor, the effort has paid big dividends in lives saved, injuries prevented and compensation expenses. The National Roof Safety Campaign which began July 1, 1957, now boasts an enrollment of about 1,300 mines. Pennsylvania has 406 mines enrolled and West Virginia 445, to lead the list. The campaign is a cooperative effort by all agencies in the industry and is not competitive among mines but within individual mines. The campaign has been underway for 5 mo, Mr. Hoch said, and it is expected that a progress report will be made after 6 mo. A similar campaign was conducted several years ago by the metal mining section of the National Safety Council and an overall reduction in roof fall accidents of 29% was achieved. However, 120 of the 250 mines in the campaign equaled or exceeded the 50% goal. As an added bene-

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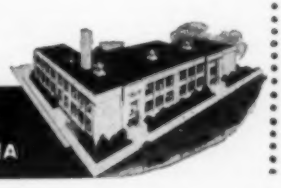

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Mining Institute (*Continued*)

fit, Mr. Hoch said, even though the campaign has concentrated on roof safety, the safety consciousness it develops should generally improve the safety record.

Regional Training

Mr. Fullarton provided a detailed description of the Pocahontas Industrial Council for Education (PICE), which was the subject of a feature appearing in the November 1957 issue of *Coal Age*. The purpose of the council is to take steps to encourage high school boys and girls to consider science and engineering as careers. Forty or more men representing the coal industry, railroads, supply houses, banks, colleges and schools and other interests in the community, formed a steering committe to propose a program. A five-point program was developed to include efforts in public relations, promoting science fairs, providing engineering speakers and advisors, analyzing school curricula and establishing vocational schools. Mr. Fullarton noted in conclusion that the tax paying public and employers of the products of our schools will not get better products unless we take a personal interest in them and demand more from them.

Selecting Safe Men

In a step-by-step analysis of accepted selection practices, Mr. Evans said that well-designed application forms, thorough interviewing and effective testing are essential in helping employers to predict whether an applicant for employment is likely to be a safe worker. With regard to the application, the form should be well designed to provide all pertinent information for preliminary observation of the applicant. Many things can be determined through a proper application form including factors that will influence a man's attitude and personality. The next step for applicants so far successful, is a thorough interview by a skillful interviewer. At the close of such a good interview, it should be possible to evaluate a man to the point where it can be stated he is poor, good or excellent as compared with good safe employees. The next step then is to provide tests to determine the man's aptitude and proficiency. The aptitude test should be able to measure an applicant's ability in picking up skills. A proficiency test, given to an experienced applicant, should be given to determine if the person is really as skillful as he says. These steps should be followed by a medical examination. There are certain jobs that require certain physical characteristics. These methods of selecting people will improve coal's safety record, Mr. Evans said. What is required is careful selection for each job and then training of the individual in proper work methods.

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SEARCHLIGHT SECTION

(Continued on pages 178-181)

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2—Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
1—150 K.W. 6 phase, A.C. Rotary Converter, 275 V.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
2—Jeffrey, 8 ton, type MH-100 2" armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
1—G.E., 4 ton, type 825 Locomotive, 22" high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G.E., 8 ton, type 822 Locamotive, 44" Ga.
3—G.E., 10 ton, type 809 Locomotive, 42", 44" and 48" Ga.
1—Goodman, 4 ton, 8-30 Locomotive, 22" above rail.
2—Goodman, type 33, 6 ton, 44" and 48" Ga.
3—Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 906, 44" and 48" Ga.

LOCOMOTIVES (Cont.)

2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
2—Diesel Locomotives, 8 and 10 tons, Excellent.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Allis-Chalmers 5'x14' Ripoflo Vibrator.
1—5'x14' Robins double deck Vibrator.
1—4'x10' Robins Gyrex Vibrator.
1—Complete five track tipple, all steel, with two compartment Jeffrey Washer.
1—Menzies tandem Hydro-Separator.
Belt Loading Booms.
1—Robins Car Shakeout.
10—Crushers, various sizes.
Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

2—Jeffrey 70 URB Cutters, rubber-tired, Universal Head, low vein.
3—Jeffrey 29UC Universal Machines on Cats.
1—Joy rubber-tired 11RU Cutter with bugdusters.
1—Goodman on cats, 31" overa'l height.
1—Baby Goodman 212, rebuilt, 250 volt DC.
1—Baby Goodman 212, rebuilt, 220 volt, 3 phase AC.
1—Goodman 312, 18" high.
2—Goodman 512's with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
2—Joy 11B Cutting Machines, rebuilt.
2—Goodman 512 Cutting Machines, 220 volt AC.
6—Goodman 12AA's and 112AA's.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
6—Jeffrey 35L's, like new, 17" high.
2—Jeffrey 35L's, on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
2—Jeffrey 29C's track mounted.
1—Jeffrey 29L on track, perfect.
2—Sullivan CR-10's, 15" high.

LOADING MACHINES

16—Joy Loaders, all types.
2—Jeffrey 61CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley No. 3 Automat Loaders.
2—Clarkson Loaders, 26" above rail.

CONVEYORS

2—Jeffrey 52-B, 30" Conveyors, 1500' each, Excellent.
4—Joy 30" Underground Belt Conveyors, 500' to 2000' each Excellent.
1—Barber Greene 30" Belt Conveyor, 1000', Excellent.
1—Robins 30" Conveyor, 1000'.
2—Jeffrey 52-B, 26" Conveyors, 1200' each.
3000' Conveyor Belt 30".
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300 ft.
2—Joy 15" Room Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
3—Long 400 DBH 15" Chain Conveyors, 25 H.P. Motors, new.

CONVERTERS AND DIESEL PLANTS

1—50 KW, G.E. TC-6, 275 volt Rotary Converter.
2—100KW, G.E. TCC-6's, 275 volt, Rotary Conv.
1—150KW, G.E. HCC-6 275 Volt, Rotary Converter.
1—150KW, 6 phase, Allis-Chalmers Rotary Conv. 275 volt DC, perfect

CONVERTERS AND DIESEL PLANTS (Cont.)

1—200KW, G.E. HCC-6 Rotary Converter, 275 volt DC.
3—300KW, G.E. HCC-6 Rotary Converters, 275 DC.
3—300KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.
1—375KW Westinghouse Rotary Converter, 275 volt.
2—500KW Westinghouse Rotary Converters, 275 volt DC.
1—200KW Westinghouse Rotary Converter, 275 DC.
1—200KW Allis-Chalmers Rotary Converter 6 phase, 275 DC, perfect.
(all the above with 6900/13000 and or 2300/4000 primary transformers)
2—150KW MG Sets, General Electric and Westinghouse.
1—200KW MG Set, Westinghouse, rebuilt.
1—200KW MG Set, General Electric, perfect.
2—150KW Allis-Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
1—300KW Westinghouse, 600 volt MG Set rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
4—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
1—500KW HCC-6 Rotary Converter, 6 phase, 600 volt DC.
1—Cummins 125 KW, Diesel with 250 volt DC Generator.
1—G.M.C. Diesel Plant with 60 KW Generator, 275 volt DC.
1—D-13,000 Caterpillar Diesel with 75 KW Generator 275 volt DC.
1—Allis-Chalmers Natural Gas Engine with 100KW Generator 275 volt DC.
1—700 H.P. Shaft Hoist, comp'ete.
Complete steam plant will sell all or any part.
Boilers, like new, 1100 H.P. and 500 H.P. Also transformers, turbines, etc.
3—Complete, Tipples with Cleaning Plants, "2 all steel."

MISCELLANEOUS

Battery Supply Tractors, rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
1—Ingersoll Rand Air Compressor, 24" overall height on rail trucks.
40 Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
1—American Mine Door Track Cleaner—new.
3—Philips Carriers.
2—Barber Greene self propelled Bucket Elevators.
Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
45 Mine Cars, drop bottom, 42" Ga.
30 Mine Cars, drop bottom, 44" Ga.
100 Mine Cars, 18" high, end dump, 44" Ga.
90 Mine Cars, end dump, 20" high, 48" Ga.
1—10 ton Mine Car Scale with Recorder.
1—150 ton Railroad Track Scale.
15—Brown Fayro HKL and HG Car Spotters.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Joy 5' Aerodyne Fan.
1—Jeffrey 6' Aerodyne Fan.
1—Jeffrey 8' Aerodyne Fan.
1—Storage Tank, 8,000 Gallon.
2—Storage Tanks, 4,000 Gallon.
1—Storage Tank, 12,000 Gallon.
10,000 Five Gallon G. I. Cans, screw lids.
800 tons Relaying Rail 25# to 80#.
10 tons Copper Trolley and Feeder.
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
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2—985 CFM Ingersoll-Rand Imperial Type Compressors 18" & 10" x 14", complete with motor and drive.
1—1572 CFM Ingersoll-Rand Imperial Type Compressor 21" & 12" x 16", with 200 HP motor and drive.

COAL CRUSHERS
1—24" x 24" Jeffrey Single Roll
1—18" x 18" Jeffrey Single Roll

COAL CUTTERS
5—Goodman type 112 shortwall, A.C.
1—Sullivan type 7B super-shortwall, A.C.
3—Sullivan type 7B super-shortwall, D.C.
6—Sullivan type CE-7, A.C.
1—Jeffrey type 28-A, A.C.

SHAKER CONVEYORS
7—Goodman type G-20
6—Goodman type G-15
1—Joy type UN-17
4—Vulcan type 25/30

BATTERY LOCOMOTIVES
1—1½ ton General Electric Trammer, 18" gauge
2—1½-2 ton Mancha Trammers, 18" gauge
3—3½-4 ton Mancha, 24" ga.
1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton 36" ga.
2—6 ton General Electric 36" ga.
2—7 ton General Electric, 36" ga.
1—7 ton Atlas—36" ga.
1—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
4—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES
1—2 ton Atlas, 18" gauge
1—4 ton General Electric, 18" gauge
2—6 ton Jeffrey, 18" gauge
1—6 ton Goodman, 18" gauge
2—10 T. Jeffrey 42" ga.
1—13 T. Goodman, 42" ga.
1—13 Jeffrey, 42" ga.
1—15 T. Jeffrey, 42" ga.

SHUTTLE CARS
1—Joy model 6003P, battery operated
7—Joy model 6001, battery operated

MINE FANS
1—120" Joy La-Del axial flow fan, model L-14
1—7' Jeffrey aerodyne 2 stage fan

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2—125-250 H.P. Ottumwa Single Drum
1—250 H.P. Ottumwa Single Drum and many other hoists in stock, single and double drum, 10 H.P. to 250 H.P.

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1055 P&H Drag, 100', 3½ yd.
K-595 Link Belt Drag, 85', 3 yd.
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802 Lima Comb. H. L. Shovel & Dragline
170-B Bucyrus Erie 6½ yd. Elec. Shovel
120-B Bucyrus 4 yd. Electric Shovel
1201 Lima 2½ yd. H. L. Shovel
54-B Bucyrus Erie 2½ yd. Standard Shovel
3500 Manitowoc 2 yd. H. L. Shovel
K-370 Link Belt 1½ yd. H. L. Shovel
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Also, various smaller Shovels and Drags
400 Reich Truck Mounted Rotary Air Drill
600 Reich Heavy Truck Mounted Rotary Air Drill
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150	G.E.	T.E.F.C.B.B.	K-6378	3600
100	Al.Chal.	T.E.F.C.B.B.	ARZ-505	1800

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2—14BU 7RBE Joy Loaders
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2—14BU 3 PE Joy Loaders
2—12BU 9E & 7E Joy Loaders
Rebuilt and Reconditioned
2—8BU 500 Volt DC
2—8BU 250 Volt DC—Rebuilt
2—Myers Whaley, #3 Loaders
2—65C Joy Shuttle Cars
2—10BC Joy Shuttle Cars, Mid-ers
5—32D Joy Shuttle Cars
2—32E7 Joy Shuttle Cars
4—32E10 Joy Cars, Rebuilt
1—32E16 Joy Shuttle Car
1—29U Jeffrey, Rubber Mtd.
1—PL11—7PE Joy Elevator
1—PL11—9PE Joy Elevator
2—40 h.p., Acme Self Propelled
Air Compressors—Permissible
1—360 Goodman Loader
2—Baker-Raulang Battery Tractors
1—RBD CP Roof Bolting Machine

CONVEYORS

1—36" Barber Green Belt 2600' Centers
2—MTB 30" Joy, 40 h.p., Permissible Tandem Drives, w 3000' centers
5000'—30" Conveyor Belting, Good Condition
1—26" Jeffrey 52B 1000' Centers
4—26" Hewitt Robbins & Joy Drives and Sections
1—24" Goodman Belt, 500' long
4—20" Joy Chain Conveyors, permissible, 300' each
4—15" Joy Chain Conveyors, Permissible
20—61AM, 61EW, 61HG, & 61W Jeffrey Chain Conveyors
53—G12½, G15 & G20 Goodman Shakers, AC & DC
2—PT12 Long Piggyback Conveyor
32—Goodman Power Duckbills, Model 477

CUTTING MACHINES

4—7AU Track Mtd. Sullivans
3—7B Sullivans
12—11B Sullivans, 35 & 50 hp
8—12AB & 12AA Standard Goodmans
3—112AA Universal Goodmans
2—212AA Baby Goodmans, 250 v.
1—212G3 Baby Goodmans, 220/440
9—512 Goodmans—2 w buggduster
2—712 Goodmans
1—824 Goodman, 42" t.g.
1—Jeffrey Arc Wall 29C
1—29U Jeffrey, 220/440, 42" t.g., Excellent
1—29UR Jeffrey, Rubber Mtd.
10—35BB Jeffrey Coal Cutters w Buggdusters—excellent condition
34—35B & 35BB Jeffreys, as is or rebuilt, w stub axle trucks
1—Lot Machine Trucks for Jeffrey and Goodman

LOCOMOTIVES

1—3 Ton Goodman
2—4 Ton Ironton 25" high
1—4 Ton HM825 G.E.
5—4 Ton Goodmans
4—4 Ton MH86 Jeffreys
1—4 Ton MH121 Jeffrey
1—4 Ton MH12 Jeffrey
1—5 Ton HM 801 G.E.
9—6 Ton MH88 Jeffreys
16—6 Ton HM803, G.E., 36", 42" or 44" t.g.
8—6 Ton HM823 G.E.
2—6 Ton HM834 G.E.
1—6 Ton HM835 G.E. 25" high
1—6 Ton G.E. Battery—All New
3—6 Ton 3314T Goodmans
6—8 Ton MH100 Jeffreys
1—8 Ton HM819 G.E. 48" t.g.
1—8 Ton HM821A G.E.
1—8 Ton Goodman, 36" t.g.
2—10 Ton MH78 Jeffreys
2—10 Ton HM822A G.E.
3—10 Ton Goodmans
3—13 Ton Jeffreys MH110
1—13 Ton Goodman
1—13 Ton HM809 G.E.
Trucks, Gears & Armature for most of these locos.

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39—36" t.g. Drop Bottoms
233—42" t.g. End Dumps, Various Sizes
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174—44" t.g. Drop Bottoms, Various Sizes
505—44" t.g. End Dumps, Various Makes and Sizes
60—48" t.g., S.D. Drop Bottom

SUBSTATIONS AND TRANSFORMERS

1—75KW Diesel Generator Set
1—150KW Rotary, Completely Automatic
1—150KW Reliance MG set 2300/4000 Volt
2—150KW MG Sets
4—200KW MG Sets
1—150KW Rotary Armature
1—200KW Rotary Armature
1—600KW Auto. Transformers
1—800KW Auto. Transformers
97—Transformers of Various Sizes

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1—Complete Cleaning Plant, including 3 Air Tables, Conveyors, Dust Collectors, Motors, Structure, Etc., at a Bargain Price
1—250' x 40" Scraper Conveyor
8—Belt Conveyors of Various Sizes: Widths of 15", 20", 24", 30", 36" and 42"
2—35' x 42" Loading Booms
2—1 Ton Budget Boom Hoists, 220/440 volt
1—36" x 36" Double Roll Crusher
1—24" x 30" Double Roll Crusher
1—5' Morrow Shaker
1—30" x 30" Double Chain Conv.

MISCELLANEOUS

15000' 4/0 Stranded and Insulated
300 tons 40#, 50# and 70# relaying rail
3—Trolley Phones
30—Hoists, from 5 to 300 h.p., All Types
5 Miles Copper Transmission Line
6—Sets Mine Track Scales
2—Sets Railroad Track Scales
1—Crossover Dump
6—Jeffrey A6 Coal Drills
1—Armco Prefab Steel Bldg. 130' long & 12' wide
1—D6 Caterpillar Dozer
1—D7 Caterpillar Dozer
1—MSA Bantam Duster
3—American Mine Door Rockdusters
1—30 h.p. MSA Rock Duster, Permissible
1—ITE Auto. Circuit Breaker
6—9J, 24J & 38J Joy Motors
14—Battery Chargers
1200' Lock Coil Cable—1½"
1—Lot Modern Store & Office Equipment
1800" 1½" Wire Rope—New
17—Air Compressors—from ½ h.p. to 40 h.p.
260—Motors from ½ h.p. to 300 h.p.
18—Fans from 18" to 6' Various Makes
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43—Pumps from 1" to 4"
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LOADING MACHINES FOR SALE

2—14BU-7BE Joy Loading Machines, 250 Volts D.C.
1—20BU-3E Joy Loading Machine, 250 Volts D.C.
1—18HR-16 Joy Loading Machine, 220/440 Volts A.C. Excellent Condition.
2—12BU-7E Joy Loading Machine, reconditioned
6—7BU Joy Loaders, 250 Volt D.C.
1—11BU Joy Loader, 250 Volt D.C.
3—8BU Joy Loaders, 250 V., D.C.
1—14BU-7RAE Joy Loading Machine.
1—114BU-7BE Joy Loading Machine
2—12BU-7H Joy Loading Machines, A.C. Excellent condition.

SHUTTLE CARS FOR SALE

6—68C-5E Joy Shuttle Cars, 250 Volts D.C., elevating discharge, 4-wheel steering.
1—Jeffrey Shuttle Car, 4 wheel drive and steer, modern, rebuilt.
1—32E-9 Joy Shuttle Car, reconditioned.
2—68C Joy Shuttle Cars, fixed elevated discharge, dita brakes, 54" high (Matched Pair).

BELT CONVEYORS FOR SALE

2—Goodman type 99-5-A836 Goodman Belt Conveyors, each 1200' long, driven by 20/40 H.P. Louis Allis permissible motors. Equipped with 4 ply, 42 oz. Goodyear conveyor belt.
1—Barber Green 36" belt conveyor, 1200' long, complete with 40 H.P. permissible drive, 4 ply, 42 oz. rubber belting.
2—97HC-30 Goodman Belt Conveyors, each 1500 ft. long, tandem drives, 40 H.P. complete with excellent 4 ply, 42 oz. rubber belt.

CHAIN CONVEYORS FOR SALE

1—61 AM Jeffrey Chain Conveyor, complete with pans, chains, each 300' long, 10 & 15 H.P.
3—61 HG Jeffrey Face Conveyors, complete.
2—PT15 Long Piggy Back Conveyors, complete with self-propelled conveyor heads, pans, and chains, 230 V. DC, permissible. Excellent condition. Can be furnished with or without 14BU-7RAE, 250 volt DC loading machines.
6—10 H.P. Long Conveyors, 300 ft. long, complete with head, tail, pans, & chains.
1—15 H.P. Long Conveyor, 300 ft. long, complete with head, tail, pans, & chains.

HOISTS FOR SALE

1—Brownie Hoist, Model HKM, Ser. No. 6801.
2—Brownie Hoists, Model HKL, Ser. No.'s.: 6856-6320
4—5 H.P. Treadwell Hoists, 250 volts D.C.

CUTTING MACHINES FOR SALE

8—35L Jeffrey Cutting Machines, 250 Volts D.C., with 7 ft. Cutter Bars. Excellent.
2—11RU Joy Cutting Machines, 250 Volts D.C., with 9 ft. Cincinnati Bar, Chain, and Buggduster. Excellent condition.
1—5B Baby Sullivan Cutting Machine. Excellent condition.
1—10RU Joy Cutting Machine, 220/440 Volts A.C., with reel and trailing cable.
2—512 Goodman Cutting Machine, 220/440 Volts A.C. Excellent condition.
6—7B Sullivan (Joy) Cutting Machines, 220/440 Volts A.C. Excellent condition.
1—11B Joy (Sullivan) Cutting Machines, 250 V. D.C. 7½' bar, Cincinnati Chain.
2—35BB Jeffrey Cutters, 250 V., D.C. 8½' cutter bars.
2—35BB Jeffrey utters, 250 V., D.C. 8½ cutter bars.
2—512 CH Goodman Cutters, 250 V., D.C., permissible, 9 ft. cutter bar.
14—512 DA Goodman Cutters, permissible 8½' cutters bars.
3—12 AA Standard Goodman Cutting Machines.
2—7AU Sullivan Cutter, 250 volts D.C.

GENERATORS FOR SALE

1—200 KW Ridgeway Motor Generator Set, complete with switchgear and 1600 amp. I-T-E automatic Circuit Breaker, 2300 AC, 275 volts DC.
1—200 KW Ridgeway Motor Generator Set, 900 RPM, complete with manual breaker, AC and DC switchgear, 2300/4000 V., AC, 275 volts DC.
1—Diesel Power Plant, consisting of 165 H.P. Cummins Diesel Engine direct connected to 100 KW G.E. Generator, Complete with switchgear and panel board.
3—50 KW G. E. Motor Generator Sets, 2300 volts AC, 275 V., DC. Complete with switchgear.
1—50 KW Westinghouse Motor Generator Set, 2300 volts AC, 275 V., DC. Complete with switching gear.
2—150 KW Westinghouse Motor Generator Sets 2300 Volts AC, 275 volts DC. Complete with switching gear.
1—300 KW Westinghouse Motor Generator Set, synchronous motor number 2589701, 433 KW output 435 KVA 2200 volts, 113 amp., 1200 RPM, input power factor 8, 3 phase, 60 cycle, DC generator number 2589799, 300 KW, 275 volts, 1200 RPM, 1200 amp., S.O. #3813216 compound wound. Complete with DC panel and switchgear.

COMPRESSORS FOR SALE

IWK 85 Joy Air Compressor, rubber tire mounted, self-propelled, 28½" high, model 240, maximum pressure 100 pounds. Excellent condition.
3—Acme Self-propelled Air Compressors, 83 R, Model 168, Capacity 176 C.F.M., with 40 H.P. Reliance Compound Motors.

RECTIFIERS FOR SALE

1—300 KW Westinghouse 2 Car portable Rectifier, 275 Volts D.C., 54" high, Primary voltage 2300/4000/4160.
2—300 KW General Electric Stationary sealed ignitron rectifiers, 2300-4000 4160 primary and 275 volts DC secondary. Complete with switching equipment and associated controls.

COAL DRILLS FOR SALE

10—CP-571 Electric Coal Drills, 250 V., DC.
25—CP-472 Electric Coal Drills, 250 V., DC.
2—CD-22 Joy Coal Drills, rubber tire mounted, self-propelled, 250 volts D.C.

LOCOMOTIVES FOR SALE

1—13 Ton Jeffrey Locomotive, Ser. No. 2304, Type MH-74, 42" t.g., Ht. 38", Controlled MB-36-E.
1—10 Ton Goodman Locomotive, Ser. No. 4371, Type 32A-04-T, 250 V., 42" t.g., Ht. 34".
1—10 Ton Goodman Locomotive, Ser. No. 4191, Type 32A-04-T, 250 V., 42" t.g., Ht. 34".
1—927 LD Westinghouse Locomotive, 10 ton rated, 48" track gauge, hydraulic brakes and sander, dynamic brakes, contractor control and spring bumpers.

ROCK DUSTERS FOR SALE

1—American Mine Door Bantam type Rock Duster, Type A, 220/440 Volts AC, 18¾" high.
1—American Mine Door wheel mounted Bantam type Rock Duster, 250 V., DC, 22" high.
1—MSA Track Mounted Rock Dusters, 10 H.P. AC 20 H.P., high pressure. Permissible, Any gauge, 38" high.
1—MSA Track Mounted Rock Duster, 10 H.P. AC or DC, High Pressure, 30" high, any gauge.

CRUSHERS FOR SALE

1—McNally-Pittsburg 36" x 48" double roll crusher, Serial No. 124T5323B, Stoker.
1—McLanahan (Bantam Buster) single roll crusher, Size 24" x 48", Serial No. B-3438.
1—Scottdale Crusher 20" x 30", double roll.

CONVERTERS FOR SALE

1—150 KW Rotary Converter, Serial No. 1054562, with 150 KVA transformer, No. 1512723, and panel boards.

ALL EQUIPMENT IS LOCATED ON OUR YARDS AT RALEIGH, WEST VIRGINIA AND IS SUBJECT TO INSPECTION
ALL EQUIPMENT IS IN EXCELLENT OPERATING CONDITION

MOUNTAIN STATE EQUIPMENT COMPANY

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William R. Monk
Res. Phone CL 3-6907
Beckley, W. Va.

Phone CLifford 3-7383
R. E. Komm
Res. Phone 4281
Summersville, W. Va.

—ADVERTISERS IN THIS ISSUE—

***Indicates more product information may be found in company advertising appearing in COAL AGE 1957 Mid-July Mining Guidebook and Buying Directory Issue. Check your Guidebook index.**

Acme Machinery Co. 151
*Allis-Chalmers General Products Div. 41
Allis-Chalmers Construction Machinery Div. 66–67
American Cable Dv., American Chain & Cable Co. 25
*ACF Industries Inc., American Car & Foundry Co. ..... Third Cover, 58
American Oil Co. 29
*American Pulverizer Co. 162
*American Steel & Wire Div., United States Steel Corp. 64–65

Baldwin-Lima-Hamilton Construction Equipment Div. 138
Barber-Greene Co. 33
Bethlehem Steel Co. 18, 102, 139
Bird Machine Co. 4
*Bixby-Zimmer Engineering Co. 152
*Bowdil Co. 59
Bucyrus-Erie Co. 115, 159

*Cardox Corp. 16–17
Caterpillar Tractor Co. 184
Coal Age 161
*Compton Inc. 155

*Denver Equipment Co. 48
Differential Steel Car Co. 44
Dodge Div. Chrysler Corp. 169
Dodge Manufacturing Co. 24
Dorr-Oliver Inc. 23
duPont de Nemours & Co., E. I. (Elastomers Div.) 157
Durakool Inc. 174

Ensign Bickford Co. 68
Ensign Electric Co. 173
Euclid Div. General Motors 45

Fairmont Machinery Co. 133
Farval Corp. 31
*Femco Inc. 175
*Flood City Brass & Electric Co. 32
Ford Motor Co. 14–15

GMC Truck & Coach Div. General Motors 100
Goodman Manufacturing Co. 13
Goodrich Industrial Products Co., B. F. 1
Goodrich Tire Co. Div., B. F. Goodrich Co. 145
*Gundlach Machine Co., T. J. 141
Guyan Machinery Co. 174

*Hendrick Manufacturing Co. 175
*Hewitt-Robins Inc. 168
*Heyl & Patterson Inc. 170
Hough Co., Frank G. 143
Hulburt Oil & Grease Co. 2–3

International Harvester Co. (Construction Equipment Div.) 20–21
International Harvester Co. (Payhaulers) 22
International Harvester Co. (Drott Mfg. Co.) 19
International Harvester Co. (Trucks) 34–35

Jeffrey Manufacturing Co. 106–107
*Joy Manufacturing Co. 48, 62–63, 147

*Kennametal Inc. 49
Koehring Co. 54–55

Lee-Norse Co. 6
*Leman Machine Co. 118
*LeRoi Div. Westinghouse Air Brake Co. 51
LeTourneau-Westinghouse Co. 127, 129, 131
*Link-Belt Co. ..... Fourth Cover, 27
*Long Co. 53
*Ludlow-Saylor Wire Cloth Co. 160
Lukens Steel Co. 61

Manhattan Rubber Div. 90–91
*Manitowoc Engineering Works 167
Marietta Concrete Corp. 176
Marion Power Shovel Co. 165
*McLanahan & Stone Corp. 156
*McNally Pittsburg Manufacturing Co. 150
Metal Carbides Corp. 171
Metallurgical Products Div. General Electric 124–125
Mine Safety Appliances Co. ..... Second Cover
*Morris Machine Works 158

National Mine Service Co. 57
*National Malleable & Steel Castings Co. 137
Neff & Fry Co. 176
New York Rubber Co. 166
*Nolan Co. 60

Ohio Brass Co. 95, 120
Okonite Co. 140

*Paris Manufacturing Co. 56
Parker-Hannifin Corp. 171
Pattin Manufacturing Co. 164
Penn Machine Co. 154
Porter Co., Inc., H. K.
Quaker Rubber Div. 37
Connors Steel Div. 36
Post-Glover Electric Co. 172

Roebling Sons Corp., John A. 153

*Salem Tool Co. 10
Sanford-Day Iron Works 88–89
Searchlight Section 177–181
Simplex Wire & Cable Co. 47
*Stamler Corp., W. R. 52
Stoody Co. 97

*Texas Co. 8–9
Timken Roller Bearing Co. 163

Union Wire Rope Co. 108–109
United States Rubber Co. Mechanical Goods Div. 135
*United States Steel Corp. 113

*Victaulic Co. of America 50

*Western Machinery Co. 142
Whitmore Manufacturing Co. 164
Wickwire Spencer Steel Div. Colorado Fuel & Iron Corp. 149
Wild Heerbrugg Instruments Inc. 46
Wilmot Engineering Co. 183
Winslow Government Standard Scale Works, Inc. 58

PROFESSIONAL SERVICES 177

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 177
SPECIAL SERVICES 177
EDUCATIONAL 177
BUSINESS OPPORTUNITIES 177
PROPERTY 177

EQUIPMENT
(Used or Surplus New)
For Sale 177–181

WANTED
Equipment 177

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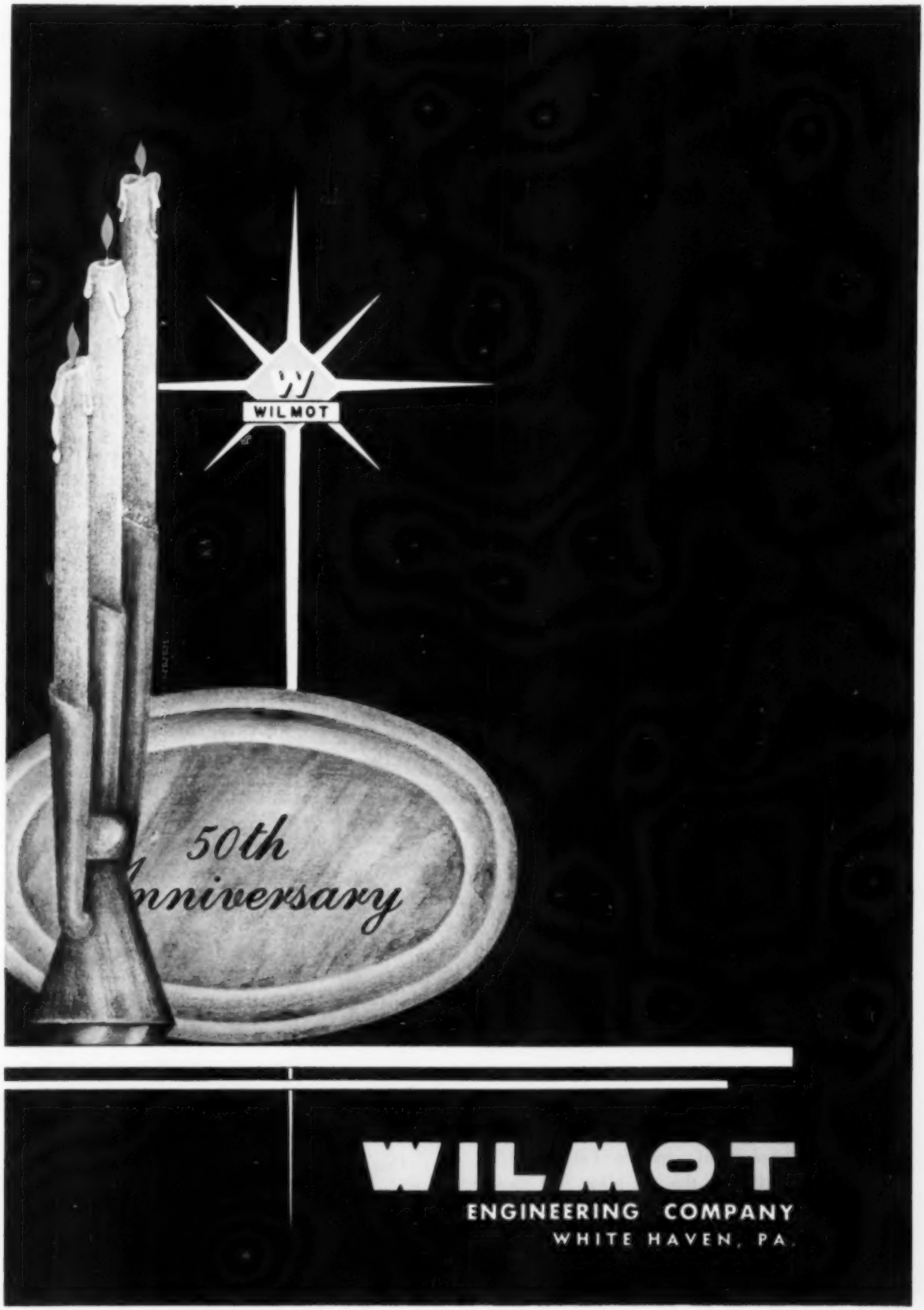
WILMOT
50th
Anniversary
WILMOT
ENGINEERING COMPANY
WHITE HAVEN, PA.

FOR INCREASED STRIPPING PRODUCTION— THE D9 WITH TILT BLADE

Zacherl Coal Co., Oil City, Pa., is using a new CAT* D9 Tractor and No. 9S Bulldozer with tilt cylinder to strip a 40-foot layer of sandstone overburden. In this tough material the big power, weight and traction of the D9 really prove themselves. And the added ability to tilt the blade quickly from side to side gives an important plus in digging action.

The hydraulic cylinder controlling the tilt is clearly shown in this picture of the D9 at work on the coal stripping job.

Raymond Zacherl, Superintendent, says: "We get good service and plenty of power out of our Caterpillar equipment. We believe this tilt blade will show a decided increase in our stripping production. Each of our D9s will move twice as much dirt as our D8."

Coal men know the D9 is built to handle the *hard* work. With 320 HP at the flywheel, 98,000 lb. of drawbar pull and a 'dozer capacity of 12 cu. yd., this machine is ready to meet and beat all comers.

If you haven't seen the tilt blade in operation, ask your Caterpillar Dealer to demonstrate it on your job. Count on his reliable service and Caterpillar parts you can trust to protect the long work life of your big yellow equipment.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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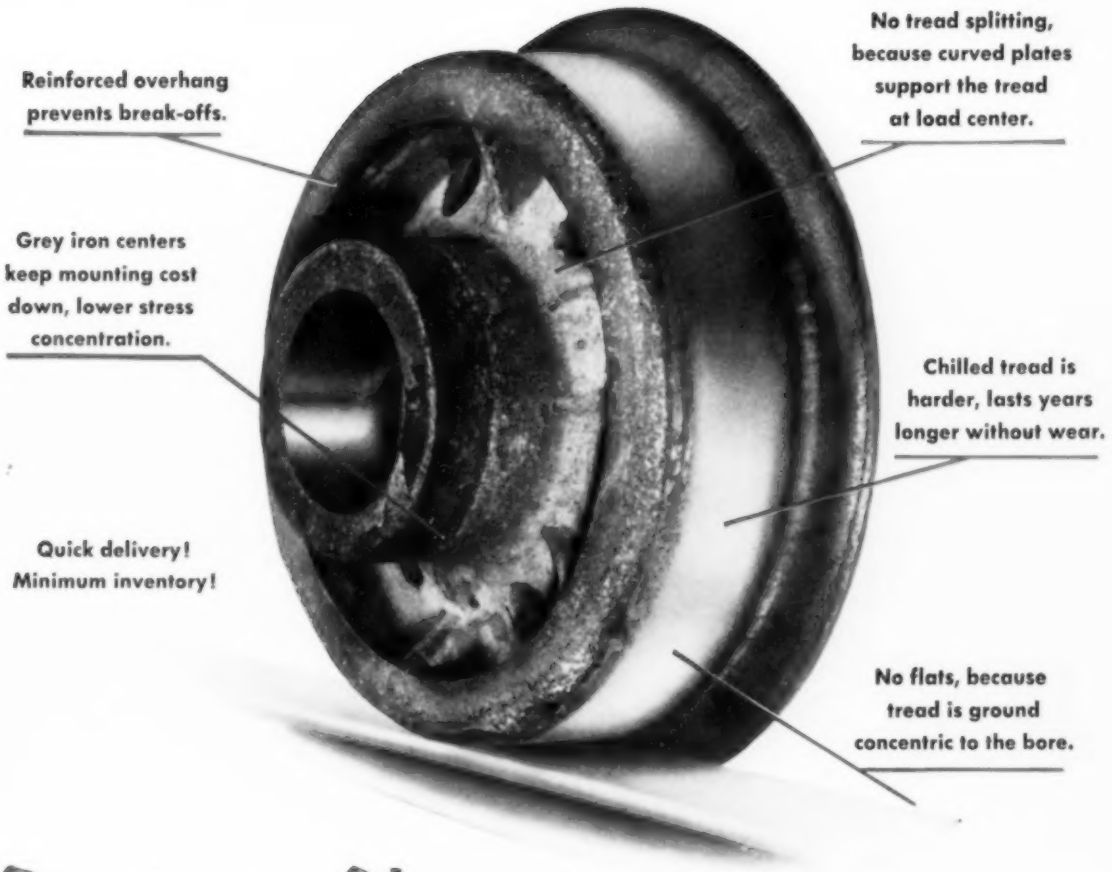
WANTED—
THE HARD WORK


Reinforced overhang prevents break-offs.
No tread splitting, because curved plates support the tread at load center.
Grey iron centers keep mounting cost down, lower stress concentration.
Chilled tread is harder, lasts years longer without wear.
Quick delivery! Minimum inventory!
No flats, because tread is ground concentric to the bore.

Center of Interest

for cost-conscious operators!

In mine after mine, acf *Load-Support* Chilled Tread Mine Car Wheels give millions of ton-miles of low-maintenance service! Extra quality in every feature gives longer service in every use, minimizes haulage delays for wheel repairs, lowers mine car wheel inventory requirements. Ask your American Car and Foundry representative for facts and figures! AMERICAN CAR AND FOUNDRY, Division of acf Industries, Incorporated, 30 Church Street, New York 8, N. Y. *Sales Offices:* New York–Chicago–St. Louis–Cleveland–Washington, D. C.–Philadelphia–San Francisco–Berwick, Pa.–Huntington, W. Va. *Plants:* Berwick, Pa.–Huntington, W. Va.–St. Louis, Mo.

acf

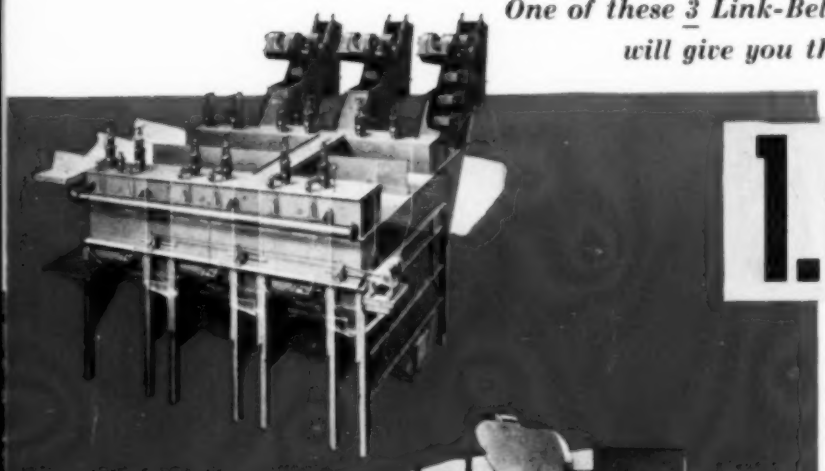
AMERICAN CAR AND FOUNDRY

DIVISION OF ACF INDUSTRIES, INCORPORATED

LOAD SUPPORT MINE CAR WHEELS

Any seam..any market-

One of these 3 Link-Belt coal washers will give you the most economical cleaning

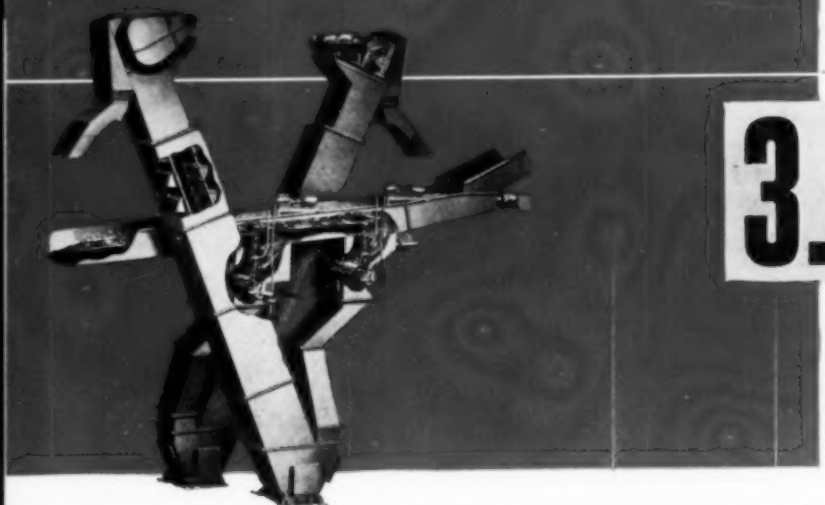


1. AIR-PULSATED WASHBOX

Extremely flexible for high-capacity cleaning of sized or unsized coal, Link-Belt air-pulsated washers are available in single and double bed models to satisfy all capacity requirements. The new dual bed model (pictured) has higher capacity due to increased washing bed width and individual bed controls . . . provides sharper separation over the entire washing area. Both models can incorporate the new Aeropoise refuse control for completely automatic refuse discharge.

2. FLOAT-SINK CONCENTRATOR

Utilizes the heavy-media separation process in a magnetite and water mixture. Efficient for extremely high or low specific gravity separation . . . when a large percentage of coal is near the separation gravity . . . when amount of impurities in feed fluctuates or product must be quickly changed. Cleans larger sizes, minimizing manual picking. Pictured is the Link-Belt tank-type, float-sink concentrator. Drum-type is available to suit varying coal conditions.



3. TROUGH SEPARATOR

The Link-Belt trough separator is used in combination with the air-pulsated washbox to handle large tonnages requiring more than one washer, with little added investment or operating expense. Trough floats off a large part of the coal, so clean that it requires no further treatment. The remaining portion, a mixture of coal and refuse, is fed to the air-pulsated washer for final refuse removal.

JOIN the many progressive mine operators who have found Link-Belt washers the answer to today's exacting coal specifications. Our engineers will be glad to work with you and your consultants . . . help you choose the right equipment for a cleaner, more marketable coal at lower cost.

LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

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